

Biodiversity Assessment for Macedonia

Task Order under the Biodiversity and Sustainable Forestry IQC
(BIOFOR)

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TABLE OF CONTENTS

SECTION I	INTRODUCTION	1
SECTION II	STATUS OF BIODIVERSITY	2
	A. Overview	2
	B. Main Landscape Zones	3
	C. Species Diversity	8
SECTION III	BIODIVERSITY CONSERVATION	17
	A. Protected Areas	17
	B. National Park Management	19
	C. Management of Lakes as Natural Monuments	21
	D. Forest Management	25
	E. Hunting and Hunting Areas	27
SECTION IV	STRATEGIC AND POLICY FRAMEWORK	28
	A. Policy Framework	28
	B. Legislative Framework	28
	C. Institutional Framework	30
SECTION V	SUMMARY OF FINDINGS	32
SECTION VI	RECOMMENDATIONS FOR IMPROVED BIODIVERSITY CONSERVATION	35
SECTION VII	USAID/MACEDONIA	37
	A. Impact of Program	37
	B. Recommendations for USAID/Macedonia	39
ANNEX A	SECTIONS 117 AND 119 OF FOREIGN ASSISTANCE ACT	41
ANNEX B	SCOPE OF WORK	46
ANNEX C	PEOPLE CONTACTED	51
ANNEX D	MAP OF PROTECTED AREAS OF MACEDONIA	53
ANNEX E	VERTEBRATE SPECIES OF MACEDONIA WITH THEIR INTERNATIONAL LEGAL AND CONSERVATION STATUS	55
ANNEX F	TAXONOMIC LISTS OF THREATENED SPECIES OF VERTEBRATES AND SPECIES OF SPECIAL EUROPEAN CONCERN PRESENT IN MACEDONIA	67
ANNEX G.	LIST OF PROTECTED AREAS IN MACEDONIA (BY IUCN CATEGORY)	71

ACRONYMS

BIOFOR	Biodiversity and Sustainable Forestry IQC
EU	European Union
FAA	Foreign Assistance Act (USA)
GEF	Global Environment Facility
IQC	Indefinite quantity contract (USAID funding mechanism)
IUCN	World Conservation Union
KFW	Kredit für Weideraufbau (German Development Bank)
NEAP	National Environmental Action Plan
NGO	Nongovernmental organization
REC	Regional Environment Center
SO	Strategic Objective (USAID planning terminology)
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WWF	World Wildlife Fund

Biodiversity Assessment for Macedonia

I. Introduction

This biodiversity assessment for the Republic of Macedonia has three interlinked objectives:

- To summarize the status of biodiversity and its conservation in Macedonia, to analyze threats, to identify opportunities, and to make recommendations for the improved conservation of biodiversity.
- To meet the requirements stipulated under Section 119.d (2) of the Foreign Assistance Act (FAA), which USAID missions must meet in developing new strategic programs. To prepare the mission to address issues arising under Sections 117 and 119 of the FAA by providing information on biodiversity and natural resources in Macedonia. (See Annex A, “Sections 117 and 119 of Foreign Assistance Act.”)
- To analyze the impacts of current and future USAID activities in Macedonia on biodiversity conservation, to suggest actions that USAID could support to further biodiversity conservation in Macedonia consistent with current and future USAID programs, and to identify special opportunities for the mission in biodiversity conservation.

The assessment was funded by USAID’s Macedonia Mission under a contract to Chemonics International Inc. through the Biodiversity and Sustainable Forestry (BIOFOR) indefinite quantity contract (IQC), a USAID funding mechanism. (See Annex B, “Scope of Work.”) A two-person team consisting of Dr. John Griffin (team leader) and Dr. Svetozar Petkovski (biodiversity specialist) conducted the assessment April 3-April 25, 2001.

The approach used in the assessment was to collect and analyze information on biodiversity and related areas by searching the literature and interviewing biodiversity specialists and representatives of key organizations concerned with biodiversity, both in Macedonia and Washington, D.C. (see Annex C, “List of Persons Contacted”). The team also carried out two field trips. The first, shorter trip was to Stip, Berovo, Lake Dojran, and Gevgelija, mainly in the eastern and southern parts of Macedonia. The second, longer trip was to Veles, Pelister National Park, Bitola, Resen, Lake Prespa, Ohrid, Lake Ohrid, Galicica National Park, and Mavrovo National Park.

The team would like to thank all those identified in the list of people contacted for their time and for the information and support they provided. In particular, the team would like to thank Vesna Sidorovska, who served as an exceptionally energetic and competent technical assistant on this project.

The team borrowed freely from strategy and project documents related to previous research and synthesized and adapted information from these documents where appropriate.

II. Status of Biodiversity

A. Overview

The Former Yugoslav Republic of Macedonia is a southeast European state situated in the central part of the Balkan Peninsula. It is located between 40° 51' 16" and 42° 22' 21" north geographic latitude and between 20° 27' 32" and 23° 02' 12" east geographic longitude and covers an area of 25,713 km². It borders Bulgaria to the east, Greece to the south, Albania to the west, and the Federal Republic of Yugoslavia to the north (see map of Macedonia in Annex D). Skopje is the capital city.



Macedonia is predominantly a mountainous country, cut by larger or smaller valleys, gorges, plateaus, and highlands. Altitude ranges from about 60 m at the lowest point to 2,764 m at the highest point. It has about 15 mountain ranges higher than 2,000 m, but only the Shara Mountain has more than 20 peaks higher than 2,500 m. From the geomorphologic point of view, Macedonia can be divided into two main regions: the western part with carbonaceous rocks and the eastern part with a great diversity of siliceous rocks.

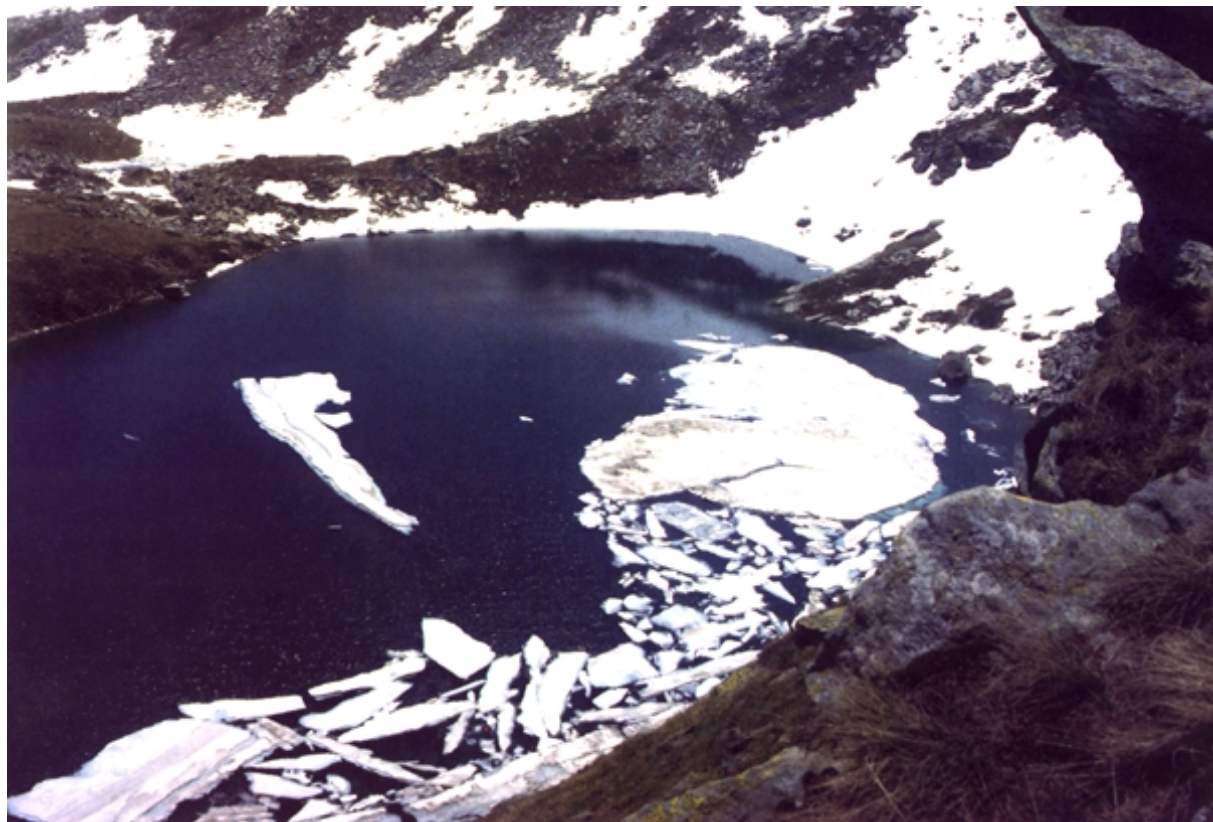
The territory of Macedonia includes 25 percent pastureland; 25 percent arable land, meadows, vineyards, and orchards; 8 percent barren land; 37 percent gazetted (legally established) forestland; 2 percent lakes; and 3 percent urban or industrial land.

Macedonia has 1,945,932 inhabitants (according to the 1994 census), with a population density of approximately 81 people per square kilometer. About 60 percent of the population live in urban areas, and during the last 20 years there has been a significant exodus from many rural areas.

According to the analyses of biodiversity, Macedonia is at the top of the list of states called “European Hotspots”. The great biodiversity of Macedonia is a result of its long historical development. The differentiation of indigenous species, as well as the invasion of other area migrants, played a significant role in its genesis. Naturally, not all species once living in the area have survived. Many species disappeared due to unfavorable living conditions. Therefore, the recent biodiversity has to be studied, not only from a genetic but also from a historical point of view. (See Annex E, “Vertebrate Species of Macedonia with Their International Legal and Conservation Status,” and Annex F, “Taxonomic Lists of Threatened Species of Vertebrates and Species of Special European Concern Present in Macedonia.”)

The Pleistocene glaciations had the most significant impact in the Balkans in that they determined the composition of its biodiversity. Consequently, the most striking feature of Macedonian biodiversity today is its great heterogeneity. On a regional scale, Macedonia has a

high level of endemics and relicts of an ancient living world, not only at low taxonomic levels—such as the Ohrid bleak (*Alburnus alburnus alborella*)—but also at high taxonomic levels—such as the Lake Ohrid sponge (*Ochridspongia, rotunda Arndt*). Most of the relicts at high taxonomic levels are found in small invertebrate animals.



The flora and fauna of Macedonia are amazingly heterogeneous: Mediterranean flora goes hand-in-hand with the plant species of the Euro-Siberian regions, while mountains are the natural habitats of bear, deer, boar, wolf, and many other animal species. Due to the impressive diversity of plant and animal species, many of which are endemic, many areas have been placed under different forms of protection. The most significant are the three national parks (Pelister, Galicica, and Mavrovo), as well as several reserves and other protected sites.



B. Main Landscape Zones

Macedonia has numerous sites with geodiversity and other areas with landscape diversity. To date, approximately 350 geomorphologic objects have been investigated. These objects are distributed within the territories of 34 municipalities in the country. From the aspect of landscape diversity, hydrographic objects are especially significant, among which the three tectonic lakes are especially to be distinguished, along with the glacial lakes, certain watercourses of mountain rivers, swamps and other rural zones, pasture areas, and the forest and mountain vegetation.



Macedonia occupies the central part of the Balkan Peninsula. From a morphogenetic point of view, it has a rich structure in that numerous minerals may be contained in one piece of rock. In addition, Macedonia has concentrations of diversity in small areas, like silicate rocks in Pelister National Park and calcium carbonate rocks in Galicica National Park, areas that are separated merely by Lake Prespa. Elevation is on average about 800 m, with 30 percent of the territory at an elevation below 500 m, 40 percent between 500 and 1,000 m, 20 percent between 1,000 and 1,500 m, and about 10 percent above 1,500 m. In this relatively small territory, are three natural tectonic lakes, over 30 glacial lakes, 23 large artificial lakes, more than 100 smaller accumulations, about 15 valleys, and about 35 larger or smaller rivers.

Due to the different natural conditions (relief structure, climate, hydrography, and soil), as well as human influence, Macedonia is one of the few countries in Europe having such a rich diversity of habitats. Numerous wafer ecosystems are provided with rich shore vegetation, and deep gorges are sources of considerable endemism and relicts. In this small region at lower elevations, big agricultural areas, meadows, pastures, and even steppe-like-desert terrain are frequently found.

Four phytogeographic regions can be distinguished in Macedonia, characterized by their different climates and elevations and, consequently, by their different flora and fauna:

- *Sub-Mediterranean Region* (40 percent of Macedonian territory). It is characterized by the presence of common tree species (*Ostria carpinifolia* and *Carpinus orientalis* with Mediterranean plants dominating), and it is spread out mainly up to 600 m. Almost all human settlements are located in this region.
- *Sub-Continental Region* (37 percent of Macedonian territory). It is spread out mainly from 600 to 1,200 m and is characterized by the predominance of Quercion- frainetto Ht. alliance (still some Mediterranean influence, not completely continental).
- *Sub-Humid Region* (22 percent of Macedonia). It comprises two belts: one belt with lower beech forest spread out between 900 and 1,250 m and a higher belt with mountainous beech forest (*Fagetum montanum*) and mixed beech and fir forest up to 1,700 m.
- *Sub-Alpine Region* (only 1 percent of Macedonia). It is spread out on the high mountains, the highest peaks of which may be characterized as a real alpine region (above 2,200 m on average).



The following biomes rank as biogeographic provinces in Macedonia:

- *Mediterranean forests and maquis*. Typical biotopes are forests with evergreen shrubs and oases of dense mesophyllous tree and herb vegetation close to springs and other types of water.
- *Mediterranean semi-deserts*. Typical biotopes are open terrain with semi-shrubs and sclerophyllous grasses with sparse needle-like shrubbery, stony sites on hilly terrain with skeletal soils and poor vegetation, dry stream-beds of temporal stream flows, and lowland sites on deep soils with sparse grass cover and semi-shrubs.
- *Sub-Mediterranean-Balkan forests*. Typical biotopes are forests of Italian and Turkey oak, *Ostria carpinifolia*, *Carpinus orientalis*, flowering ash, black pine, chestnut, Macedonian oak, as well as plain forests in river valleys.
- *Balkan-Middle-European forests*. Typical biotopes are forests of mountain beech, mixed beech and fir, maple and birch, spruce, and alder in river valleys; wet meadows; and forest swamps and streams.

- *European forests of taiga type* - Typical biotopes are spruce forests, Scotch pine forests with blueberries, mixed forests with spruce and fir and spruce and beech, *Pinus mugo*, forest peat-bogs, and forest creeks, swamps, and lakes in the above-mentioned forests.
- *European alpine rocky-grounds, tundra and alpine pastures*. Typical biotopes are various types of alpine rocky terrain, glaciers, and pastures.



- *Mediterranean mountain forests on rocky grounds*. Typical biotopes are forests of Macedonian-molika pine (*Pinus peuce*) and *Pinus pallasiana* and alpine rocky pastures with groups of huge blocks of rocks, vertical scarps, caves, rocky grounds with large stones, taluses, and avalanche areas.
- *South-Balkan mountain rocky-grounds and dry pastures*. Typical biotopes are alpine pastures with rocky grounds and shrubs, blueberries and other berries, groups of rocks and stones in the middle of the pastures, forward stony crests, and rocky grounds with large stones on slopes.

Because little of the Macedonian territory has been studied, the percentage representation of these biomes is obscure. Nevertheless, it is certain that sub-Mediterranean-Balkan and Balkan-Middle-European forests occupy the biggest area.

C. Species Diversity

Macedonia contributes greatly to the species diversity of Europe. The country contains between 3,200 and 3,500 species of vascular plants, 485 species of vertebrate animals, and 6,844 species of invertebrate animals.



C1. Flora

Macedonia's vegetation is rich and diverse, especially in its micro-organisms and its thallophytic (algae, lichens, and fungi) and cormophytic plants. The aquatic, miry, halophytic vegetation and the vegetation of lowland meadows has been well studied, while the vegetation of hilly pastures is under intensive research. The vegetation of mountainous and subalpen zones, as well as mountainous vegetation, are also under intensive research. Significant portions of explored vegetation types certainly require review, in terms of typological and

nomenclature approximation with the provisions of the International Codex on phytocenosis nomenclature. Scientific assessments thus far attribute particular importance to the presence of endemic, relict, and rare species of flora in Macedonia.

Within the more than 3,000 species of vascular flora are 132 different plant communities (ranging from aquatic to alpine ones), including:

- 21 aquatic and swamp communities
- 8 halophytic communities
- 2 steppe communities
- 50 forest communities
- 51 alpine communities

The dendroflora variety may be seen in the presence of 319 tree species, with more than 80 sub-species and varieties. Within forest ecosystems, more than 80 phytocenoses have been identified. The forest cover is of huge importance for the protecting the land and water and for maintaining biodiversity.





Macedonia has been insufficiently explored from the mycological point of view. So far, about 1,500 species of fungi have been identified. The protection and sustainable use of native species of rare or threatened fungi is of particular importance for the preservation of biological diversity. About 66 species of fungi identified as threatened species have been identified in Macedonia.

Many cultivated representatives of fungi also exist. The cross breeding of selected genetic resources has created numerous varieties of edible fungi, as well as some varieties that serve for decoration as horticultural items. The number of obtained hybrids of consumable, exotic, and decorative fungi is also difficult to determine. The extension of agrarian areas and breeding of mono-crops has destroyed genetic resources and natural areas of wild species of fungi.

C2. Fauna

Macedonia receives influences from many biogeographic territories. Frequent changes in global ecological conditions in geological history have greatly contributed to the occurrence of exceptionally heterogeneous fauna. It has made this area a center of speciation for many groups of organisms. As a result of this process, a high level of endemism is present within most animal groups.

C2a. Invertebrates

Although the diversity of invertebrate fauna is enormous, it is still to be adequately investigated. Even in extremely small areas, the diversity of invertebrate species can exceed that of the coral reefs. Thus far, 6,844 invertebrate species have been ascertained in Macedonia, including 4,665 species of insects. Included in the number of insect species are 2,295 species of butterflies, three times as many as in Albania and twice as many as in Bulgaria. Without doubt, Macedonia deserves to be called the “Land of the Butterflies.”

Some other invertebrate species in Macedonia include the following:

- The acellular animals (Protozoa) have scarcely been investigated, except for a few aquatic ecosystems. All together, 42 species have been recognized, 37 of which are restricted to Lake Ohrid. The level of endemism is 88 percent. There are 9 species of sponges, 6 of which are Macedonian endemites, making the degree of endemism 66 percent.
- Within the flatworm phylum, only the Turbellaria class has been well investigated, with 40 species for the whole territory of Macedonia. At Lake Ohrid, 23 species are recognized, 17 of which are Ohrid endemics. There are 90 species of aquatic gastropods, 58 of which are

present in Lake Ohrid. Because 50 species are Ohrid endemics, the level of endemism is 86 percent.

- From the Chelicerata subphylum, 407 species of spiders, 123 species of acarines, and 37 species of pseudo-scorpions have been recognized. Concerning only the pseudo-scorpions, the mean degree of endemism is 54 percent, but it varies from 20 percent to 75 percent in separate taxonomic groups.
- All together, 474 species of crustaceans have been found in Macedonia, 105 of which are branchiopods; 170, ostracods; 140, copepods; and 59, malacostracans. In general, the crustaceans' fauna of Macedonia is distinguished by the high level of endemism, which may extend up to 90 percent in different taxonomic categories.

C2b. Vertebrates

The major factors contributing to the great vertebrate diversity of Macedonia are its central position of Macedonia in the Balkan Peninsula and, its exposure to varying climatic influences, modified by complex and prevailing mountain relief, and various petrographic and edaphic conditions of land. The vertebrate fauna of Macedonia consist of 485 species, including 49 species of freshwater fishes, 15 species of amphibians, 32 species of reptiles, 307 species of birds, and 82 species of mammals.

C2b(1). Fishes

In Macedonia's natural lakes and rivers, 65 taxa of freshwater fishes have been ascertained or, more precisely, 49 species (43 indigenous and 6 introduced) and 16 subspecies. The level of endemism within this group of vertebrates is 74 percent. Nine species and 32 subspecies are Macedonian endemics, while another 5 taxa are Balkan endemics.

The most important endemic species from the economic point of view is the Ohrid trout (*Salmo letnica*), famous for its special taste. Another Ohrid endemic species of commercial importance is the Ohrid bleak (*Alburnus alburnus alborella*). The scales of this species are used for preparing the unique "Ohrid pearls." The third endemic taxon that has also major commercial importance is the Dojran roach (*Rutilus rutilus dojranensis*), which is taken in larger quantities than any other fish from Lake Dojran



C2b(2). Amphibians and Reptiles

Macedonia with its central position on the Balkan Peninsula is not only a center of the endemism of amphibians and reptiles in Europe, but it is also a bridge between the batracho and



herpetofauna of Europe, Asia, and Africa. Macedonia has 15 species and 6 subspecies of amphibians and has 32 species of reptiles, including 2 tortoises, 2 terrapins, 12 lizards, and 16 snake species. The level of endemism is 24 percent.

C2b(3). Birds

The Balkans are one of the two richest avifaunas in Europe (the second is the Iberian Peninsula). The greatest bird diversity is found in Macedonia, where 307 bird species have been recorded. (In comparison, 450 species have been recorded for the whole European continent.) From here, the diversity cascades southward, across Sterea Hellas, finishing in Peloponnisos.

Considering that Macedonia has no coastline to attract birds, the level of coverage is even more impressive. Because of their mobility, no birds are endemic in Macedonia.



C2b(4). Mammals

Macedonia has 82 mammal species in 51 genera, 18 families, and 6 orders. (All of Europe has only 194 mammal species.) Human beings have introduced eight species into Macedonia, either deliberately or accidentally, and the red deer (*Cervus elaphus*) has been reintroduced. The number of recent human-induced extinctions is low and includes, besides the red deer, the golden jackal (*Canis aureus*). Many domesticated mammals have established permanent feral populations. Among the 25 taxa originally named and described from Macedonia, 3 are currently considered to be valid species: Balkan mole (*Talpa stankovici*), Balkan pine vole (*Microtus felteni*), and Balkan short-tailed mouse (*Mus macedonicus*). Although the first two have small ranges in the western Balkans, they are all strictly endemic to Macedonia.

C3. Agrobiodiversity

At the crossroads between Europe and Asia, Macedonia became the home for diverse types of plants in past centuries. Many international, bilateral projects were undertaken in the 1960s and 1970s, most of them with the United States, to collect seeds and plant materials from cereals, fruits, and vegetables. These accessions were stored overseas due to the absence of storage facilities that that time in Macedonia.

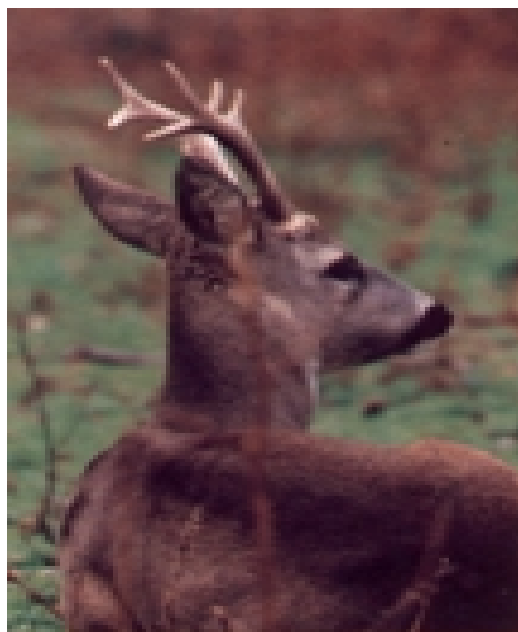
Hundreds of flora genetic resources (originating in different regions of Macedonia) have been collected, evaluated by international codes, and conserved in gene banks of existing research institutions in the country. Some of those plants were conserved after the Second World War in the gene banks of the United States and of the former Soviet Union.

After Macedonia gained its independence in 1991, several attempts were made to reorganize the gene bank. In the last 2 years, the fundamental infrastructure of a central gene bank has been established and equipment has been acquired at the Institute of Agriculture in Skopje.

Currently, four institutions maintain agrobiodiversity in Macedonia:

- The Institute of Agriculture in Skopje maintains accessions of about 250 cereals (mostly domestic), 100 fruit trees, and 40 varieties of foreign grapes.
- The Institute of Agriculture in Strumica conserves more than 110 accessions (of national and foreign origin) of vegetables and industrial crops (peppers, tomatoes, melons, peanuts, cotton, and sesame).
- The Institute for Tobacco in Prilep maintains 25 Macedonian tobacco cultivars.
- The Institute for Rice in Kochani maintains 200 rice accessions, of which 37 are of local origin.

A simple search undertaken on the U.S. Genetic Resources Information system (GRIN) identified over 1,500 accessions collected in Macedonia from 1970 to 1972, belonging to the genera *Beta*, *Brassica*, *Cucumis*, *Cucurbita*, *Daucus*, *Foeniculum*, *Malus*, *Pyrus*, and *Petroselinum*. After discussions with National Seed Storage Laboratory in Fort Collins and the Macedonian Institute, the U.S. Department of Agriculture (USDA) agreed to assist in the



repatriation of Macedonian germ plasm conserved in the USDA system. The repatriation will probably take several years, depending on the reproductive potential of the participating institutes.

C4. Threats to Biodiversity

Macedonia's biodiversity faces many threats:

- New legislation has been developed, and laws are in place. However, the laws have not been completely implemented. New laws are established but no money is available to enforce them. For example, Ezerani reserve was established as a strict natural ornithological reserve in 1994 on the north shore of Lake Prespa. Yet, no money has been available to put up signs stating that the area is protected. Other similar “paper-protected areas” have been set up as well, without the ability to enforce the law. In many of these areas, no permit is needed to collect medicinal plants or other items. It is a good first step that national planning has integrated the locations of rare and threatened species and put them on paper. Yet this is not enough. People need to be informed about the laws, and protected areas need to be managed as such (with at least signs in place, so that people know that the areas are strictly protected). Also the legal system is exceptionally slow to follow up on trespassers, and often the offender is not penalized in any way. This aspect of enforcement also needs to be addressed. In addition to sanctions, efforts must be made to find positive incentives to encourage the government and the general population to conserve biodiversity.
- In some areas, cutting forests for production of firewood is an issue, though it is not a significant threat in most areas of the country. It is more of a threat in poverty-stricken areas, where no management of natural resources is exercised. Potential threatened areas include the Kosuf Mountain, as well as along the Pena River (near Sharplanina), also near Prespa along the Brajchinska River. However, regeneration is occurring faster than deforestation in most locations.
- Uncontrolled collecting of medicinal plants for the pharmaceutical industry, especially outside of protected areas, is a problem. The main issue is determining who can control this practice. In many areas, forestry offices are present but unable to control resource harvesting. Information campaigns are needed to educate people about sustainable systems of collecting and to create awareness among local communities and, more importantly, to involve them in management.
- Because mountain areas in the country are already protected, one of the most threatened areas is the drainage of wetlands, especially in areas of intensive agriculture. The channeling of the Strumitza River also severely affected the lowest part of the Skopje Valley (the last remnant of Skopje Valley Lake), the Katlanovo Swamp.
- Overuse of fertilizers, pesticides, and herbicides has had a detrimental impact on the lakes in the south, which have high endemism and biodiversity. For example, in Resen, near Prespa, apple orchards are treated 16 to 17 times per year. Because Macedonia is unlikely to be able to compete in international markets due to its size, it would possibly make more sense to focus on organic production, which would yield higher profits. In addition, wetlands

previously filtered some of the agricultural inputs, but they no longer do so because most have been converted through agricultural expansion.

- Lakes are also being drained. For example, Greece is pumping water from Lake Dojran and Greece and Macedonia are pumping water from Lake Prespa for hydroschemes and irrigation systems. Efforts should be made to coordinate management and leave a biological minimum of water. The impact of drainage on the lakes depends on their depth; hence, Dojran and Prespa are threatened while Ohrid is not (except for the littoral zone in Ohrid). In Dojran, for example, algae declined from 257 taxa in 1988 to merely 109 taxa in 1998. (They are now all extinct.)
- The lack of biological corridors, especially for lowlands, tends to isolate biodiversity in islands. Corridors existed 30-40 years ago but were eliminated with agricultural and urban expansion. Re-establishing corridors would require planned conservation initiatives every 5-10 km of a 20-30-m belt through a valley. Corridors are especially needed in the Peligonia Valley, where grain is harvested, and near Bitola. Although biodiversity falls “officially” under the mandate of the Ministry of Environment, the Ministry of Agriculture would need to take a lead role in this effort by raising awareness and providing technical assistance. Corridors would also benefit agricultural lands because insects that pollinate grain would be living in the bio-corridors. In a smaller way, the corridors would also serve as areas of micro-climatic support. Also, tunnels need to be developed between Sekirnik and Susica near Strumica, and signs need to be posted, warning drivers that this area is a critical passage zone for frogs and toads migrating in the breeding season, including the Balkan-endemic, endangered spadefoot toad.
- Along the hilly regions and along the Vardar River, erosion is a problem. A similar problem related to engineering actions is the River Sateska, near Ohrid. Formerly, the river flowed, into the Adriatic Sea; now, it flows into the lake. This river is laden with silt, and the situation should be assessed to determine whether the river can revert to its original flow.
- Overfishing and poor fishing practices are threats in specific geographic areas. In Lake Ohrid, the threat is from shoreline fishing. In Lake Dojran, the threat to fishing is more from the reduction of water. Once one of the most productive lakes in Europe, Lake Dojran fish production declined from 529 to 193 tonnes per year from 1946 to 1989. In addition to a decline in the total number of fish, the composition of the fish population has also changed



significantly. Also in Lake Ohrid, the Ohrid trout has declined, even though the Hydrobiological Institute has been restocking the trout for many years.



- Industrial pollution is a problem. For example, the smelter in Veles discharges into the Vardar River, polluting the water so badly that it is not fit even for irrigation. Environmental groups and other citizen groups have tried to address this problem numerous times, without success. One current complaint has been sitting in the court system since 1993.
- Forest fires are a threat in the Mediterranean and Sub-Mediterranean zones and along the Vardar River, but not in the national parks. In 2000, fires destroyed 5 percent of the forest cover. These fires were often started by the dropping of a burning cigarette or by some other careless action. The excessively dry condition of the last few years has exacerbated the threat. In part, the inability to manage the fires is the result of limited management personnel and technical resources.

Forest fires are no threat in parks with adequate communication and transport equipment. Forestry staff most often cite the lack of vehicles and modern communication equipment as the major reasons for their inability to control fires. In the future, helicopters may be used to reach more inaccessible locations. Forest fire management would benefit from continued regional exchanges and from some assistance from USDA with appropriate technologies and improved monitoring systems

III. Biodiversity Conservation

A. Protected Areas

Only a little more than 7 percent of Macedonia is some type of protected area — far below the international goal of 12 percent. However, a proposal to establish the Shar Planina National Park (about 52,000 ha – or 2 percent of the land) would bring Macedonia's protected area to approximately 9 percent, much closer to the internationally recognized goal.

By World Conservation Union (IUCN) category, Macedonia's protected areas are as follows:

- Category I: Strictly Protected Natural Reserves. Macedonia has two strictly protected natural reserves:
 - Ezerani, on Prespa Lake, with 2,080 ha, a wetland area. Biodiversity is represented mainly by swampy and grass vegetation and water birds.
 - Tikves, in the gorge of Crna Reka with 10,650 ha. Biodiversity is represented by hilly and mountainous dendoflora, birds of prey, water birds, and animals.
- Category II: National Parks. Natural parks are the largest area of protection, covering 108,338 ha. These are all in forested, mountainous areas:
 - Mavrovo, with 73,088 ha, was declared a park in 1958. Some 27,000 ha are forested. It is estimated to include more than 1,000 types of higher plant forms, about 100 (or 10 percent) of which are extremely rare and which are endemic to the Balkans. Mavrovo is also home to over 100 brown bears and other fauna.
 - Galicica, with 22,750 ha, is situated between Lake Ohrid and Lake Prespa and was declared a park in 1958. The vegetation in this park is particularly rich with 19 different forest communities and several extremely rare types of flora.
 - Pelister, with 12,500 ha, the oldest national park — was established in 1948. The park gets its name from the five-needle Molica (Pelister or Macedonian) pine, the only such variety in the world, and covers approximately 1,600 ha — the largest concentration of this Balkan endemic (which also has a small population in Bulgaria). Pelister is also home to over 27 brown bears and other fauna.
- Category III: Natural Monuments. Natural monuments occupy 58,084 ha. Biological diversity within the natural monuments is mainly represented by aquatic flora and fauna species (in water ecosystems), grass, swampy, hilly and mountain flora, fungi, and fauna. These include the three glacial lakes:
 - Ohrid Lake with 23,000 ha
 - Prespa Lake with 17,680 ha
 - Dojran Lake with 2,730 ha

The natural monuments also include numerous other natural features:

- Gorge of Matka with 5,443 ha
- Katlanovski predel with 5,442 ha

- Markovi kuli (The Tower of King Marko) with 2,300 ha
- Monospitovsko Blato (Swamp) with 250 ha
- Demir Kapija with 200 ha
- Arboretum Gazi Baba with 3,3 ha
- Iceland of Gazi Baba with 13 ha
- Gol Covek (Naked Man) with 5 ha
- Drenacka Klisura (Gorge) with 5 ha
- Karsi Bavci with 10 ha
- Murite with 10 ha
- Konce with 0.7 ha
- Morodovis with 0.5 ha

Examples of IUCN Category III — Natural Monuments

Demir Kapija - This is the longest gorge of the Vardar River (19 km). It passes through limestone and eruptive rocks that divide Tikvesh valley on the northwest and Gevgelija-Valandovo valley on the southeast. The entrance into the gorge is an especially impressive canyon, 0.9 km in length, with different carstic shapes on its slopes. The Demir Kapija gorge is among the richest ornithological reserves in Europe. The rare birds of prey include griffin vulture (*Gyps fulvus*), Egyptian vulture (*Neophron percnopterus*), golden eagle (*Aquila chrysaetos*), shot-toed eagle (*Circaetus gallicus*), long-legged buzzard (*Buteo rufinus*), and different falcons (*Falco peregrinus*, *Falco naumanni*). Other rare and scientifically important bird species are also present in this area. In the Demir Kapija gorge, important mammal, reptile, and insect species are present, as well as rare and endemic plant species (*Caladonia macedonica*, *Lilium martagon*, *Kitaibelia vitifolia*).

Markovi Kuli – Massive rocks called Markovi Kuli are located in the central part of Macedonia, north of the town of Prilep. They are composed of numerous small denudation shapes dating from the Precambrian Age. They are composed of granite, with shapes representing relief sculptures (peaks, earth pillars, columns, and plaques). The height of separate massifs is over 1,000 m. From the floristic point of view, the presence of endemic plants is important.

- Category IV: Natural Reserves. Macedonia has three natural reserves of special natural features, which occupy 2,338 ha (0.09 percent):
 - Leskoec (300 ha)
 - Vodno (1,953 ha)
 - Kozle (85 ha)
- Category V: Individual Plant and Animal Species Outside Nature Reserves. Individual plant and animal species outside of natural reserves occupy 2,647 ha or 0.10 percent of the territory. There are 14 sites of natural habitats of wild flora, fungi, and fauna species. They contain mainly protected species of dendoflora (primarily pine, fir, yew, juniper, oak, beech, birch, and wild chestnut).

See Table 1 for the total size of areas in each category. (See Annex D for a map of these areas.)

Table 1. Protected Areas in Macedonia by World Conservation Union (IUCN) Category

IUCN Category	No. of Areas	Total Size of Area (ha)	Percent of State Area
I – Strict Nature Reserves (scientific)	2	12,730	0.49
II – National Parks	3	108,388	4.2
III – Natural Monuments	48	58,084	2.25
IV – Natural Reserves, Areas of Special Natural Features	3	2,338	0.09
V – Individual Plant and Animal Species Outside Nature Reserves	14	2,647	0.10
TOTAL	69	184,137	7.16

B. National Park Management



Currently, the national parks are each managed more or less independently and relatively cost-effectively. The parks are managed as nonprofit enterprises independent in many ways from the central government. However, various institutions manage the protected areas; consequently, conflicting roles and responsibilities can be a problem.

Exploitation of resources is allowed in the park and is the main source of revenue for management. Timber harvest revenues are the main source of this funding but may be inappropriate for sustained management of protected areas. However, entry fees and concession fees for hotels and ski resorts are currently not used to generate revenue. In part, the refusal to use these more traditional ways of generating revenue for protected areas is due to a socialist form of government and to the absence of a “user pays” principle.

The three parks have a general director, with headquarters in Skopje. The director has more of a representational role than a functional role in coordinating management of the individual parks. Furthermore, no communication appears to exist among the individual parks. Still, all the directors of the national parks are part of the “Union for the Conservation of Nature,” a nongovernmental organization (NGO), through which some communication takes place at an informal level.

Although management plans exist for protected areas in Macedonia, they are primarily restricted to broad directions on the harvesting of timber and associated hunting and staffing issues. In general, the parks are run more as forestry



concessions than as national parks. The management plans do not address staff development, interpretation, visitor relations and tourism, financial management and revenue generation, monitoring, law enforcement, public relations, or collaborative management. Nevertheless, the staff interviewed during this assessment were aware of these other areas of management and were making efforts to incorporate them into their activities.



Surprisingly, on the whole, the parks appear to be managed relatively well for their current expressed objective, which is to function as a cross between forest reserves and national parks. For example, almost all the management staff are foresters by training (though a few of them have administrative, accounting, or legal backgrounds). Although some of the directors have visited numerous protected areas in Europe and the United States as part of study trips, they have not participated in any formal training in the management of protected areas. As with almost all other environmental organizations in the country, virtually no social scientists, economists, public relations, interpreters, or other human relations specialists are on the park staff. The lack of these specialists will prove increasingly problematic, as most management threats are related to human actions. The parks also lack biologists. Currently, the parks rely upon academics to monitor their ecosystems, but in the future, they may want to do these assessments themselves.

No system plan or network for protected areas exists. As in many other countries, the highlands were set aside primarily as protected areas, and they were established less for reasons of biodiversity conservation than for watershed, scenic, or other reasons. Because these areas have a large variety of elevations and because they are located in the more diverse western region of the country, they tend to have high concentrations of biodiversity. Due to the protected status of Lake Ohrid and Lake Prespa, the biodiversity of these areas is preserved. However, lowland

areas with other forms of biodiversity— such as the wetlands, Mediterranean forests, and other ecosystems—are severely underrepresented (if represented at all) in the existing protected areas. Many have expressed concern that the new legislation for national parks may have a negative impact on successful experiences to date.

Unfortunately, to date the process for developing the new legislation has not included consultation with existing managers and others with technical skills in this area. Under the new law, the Ministry of Environment will manage national parks. In some ways, this law makes one organization responsible for the overall environmental management of the country. On the other hand, the Ministry of Environment will lose its decentralized status, which has until now allowed it to be self-sufficient and sustainable. Increased inefficiencies are likely to result from the centralization of its management. In addition, centralization may have an adverse impact on the budget. Another fear is that due to the political nature of government, the current lean staffing structures will become bloated and inefficiencies will result. Less likely, though also a threat, is that the government may now more severely exploit park resources to cover other government expenditures. Until now, the parks have been fairly cost-effective, matching revenues with expenses.

C. Management of Lakes as Natural Monuments

Both the Ministry of Environment and the Ministry of Agriculture, Forestry and Water Management are involved in the management of the lakes. However, neither has clear responsibility for the lakes. Local government authorities also play a role in the management. Who actually makes decisions and champions biodiversity conservation for these areas is unclear, which creates confusion. The Ohrid, Prespa, and Dojran lakes have an exceptionally rich biodiversity, having 146, 39, and 26 endemic species, respectively.

C1. Lake Ohrid

Lake Ohrid is one of four lakes believed to have been formed during the Tertiary period, some 2 million to 4 million years ago, making it one of the world's oldest lakes. (The other three lakes are Lake Tanganyika, Lake Caspi, and Lake Baikal.) The lake has flora and fauna that were characteristic of that period, much of which is extinct elsewhere. Lake Ohrid is also known as one of the largest biological reserves in Europe and as the deepest lake (287 m) on the Balkan Peninsula.

Due to its age, geographic isolation, and favorable hydrographic conditions, Lake Ohrid has 146 endemic species. Some of the species are living fossils that have remained unchanged from the Tertiary period. The living fossils include endemic sponge; 50 species of relict aquatic snails (with shells), out of 58 species of these snails in all of Macedonia; several relict species of worms, Ohrid trout (*Salmo letnica*), and belvica (*Acantolingua ochridana*); and 10 to 17 endemic fish species. There are also numerous algal species, among which diatoms are the most numerous. In addition, there are five particular endemic species that are restricted to small areas of the lake offering special microecological systems. Finally, the reed belts in the littoral zone have high ecological significance as a biotope for various aquatic birds, as well as for fish spawning grounds. Because of the lake's rich history and unique flora and fauna, the UN

Educational, Scientific and Cultural Organization (UNESCO) declared Lake Ohrid a World Cultural and Natural Heritage Site in 1980.¹

Two-thirds of the lake's surface area of 358 km² belongs to Macedonia, while the remainder belongs to Albania. The fact that Lake Ohrid is a transboundary area presents additional challenges to its sustainable management. To address this issue, the Global Environment Facility (GEF) is implementing a project to manage protected areas across borders.

Lake Ohrid

Threatened in part by inadequate environmental management of the catchment area, Macedonia and Albania are developing a management program for Lake Ohrid, with the support of the Global Environment Facility (GEF). The objective of the project is to encourage the two countries to collaborate in protecting the lake by:

- Developing an institutional, legal, and regulatory framework
- Establishing a monitoring system
- Preparing a Lake Ohrid Strategic Action Plan and Investment Program
- Financing small-scale pilot conservation activities

The catchment area of the lake currently covers 1,487 km², as a result of its being artificially enlarged by 460 km² in 1962 when the River Sateska, previously a tributary of River Crni Drim, was diverted into the lake near Struga. In reality, the effective size of the catchment is substantially larger because several springs along the shores of Lake Ohrid are supplied from Lake Prespa (which lies 200 m higher and is separated from it by a mountain range). Approximately 46 percent of the inflow of water to Lake Ohrid comes from Lake Prespa; hence, biodiversity conservation issues for Lake Ohrid are critically linked to the situation of Lake Prespa.



A clear danger exists to maintaining the long-term ecological stability of Lake Ohrid unless action is taken to improve environmental management of the catchment area and the shoreline to prevent the accumulation of pollutants in the lake. These actions are critical because the amount

¹ In 1979, Lake Ohrid was listed in the World Heritage List. In 1980, this region was nominated as Ohrid natural and historic-cultural region due to the important historic-cultural values of the broader territory.

of inflow and the outflow is so small that the lake's water is exchanged approximately only every 60 years. This long water-retention time is the main reason the lake reacts slowly to pollution. Despite several remedial measures, less than 25 percent of the wastewater in the catchment is treated. After untreated wastewater, the second major source of pollution is the inflow of nutrients from erosion and agricultural run-off. Fertilizers and herbicides infiltrate the lake basin, causing pollution. To keep the mean concentration of phosphorus below 7 mg/m, the current level of dissolved phosphorus will need to be reduced from approximately 150 tonnes per year to 100 tonnes per year.

In 1965, the construction of a dam on the river Crni Drim (the Ohrid Lake effluent) interfered with the natural migration of the eel (*Angrilla angrilla*) in and out of the lake. At present, Lake Ohrid is artificially stocked with the eel.

C2. Lake Prespa

Lake Prespa covers 320 km², is situated just east of Lake Ohrid and between the Pelister and Galicica national parks, and is bordered by Greece and Albania. The deepest part of the lake is 54 m deep. Fish species are 80 percent endemic. From the phytocoenological point of view, the presence of the endemic plant community *Lemneto-Spirodeletum polyrrhize aldrovandetosum* is the most important.

The problems of Lake Prespa are similar to those of Lake Ohrid, but to a lesser extent. In addition, the level of the lake has dropped considerably during the last 10 years, due to the same reasons noted for Lake Dojran — an unfavorable hydrological regime and extraction of the water by the bordering countries.



When the Ezerani Reserve was established, it was included on the World Convention on Wetlands of International Importance (known as “Ramsar”) list, obligating Macedonia, as a full member of this convention, to protect the region around the lake. The management of Ezerani is unique in that it is managed by the Bird Study and Protection Society of Macedonia (BSPSN), an NGO, instead of by the local government. Unfortunately, as with most NGOs in Macedonia

(especially environmental NGOs), limited financial resources mean two volunteers do the managing. In effect, the area is “established” as a protected area. However, many aspects of management are not yet in place. For example, resources (such as sand) continue to be extracted; no signs at the boundaries or even at the entrance to the area by road identify the area as a reserve; and local communities use parts of the reserve as a waste disposal site. Still, placing the management of the reserve in the hands of an NGO is an example of innovative management that Macedonia may want to emulate elsewhere. A Biosphere Reserve is being proposed for Lake Prespa, Lake Ohrid, and the surrounding protected areas, with the support of the GEF and the Kredit für Weideraufbau (German Development Bank, KfW).

Fishery

Since the Hydro-biological Institute was established in Ohrid in 1934, it has stocked the Ohrid Lake with the nursed progeny of Ohrid trout. To date, the institute has stocked the lake with 430 million young fish. The institute uses breeding installations having a capacity of 22 million grains of roe per year. The spawning is organized so as to facilitate the natural reproduction of Ohrid trout after the fishing season.

Over the past 10 years, the fish catch from Lake Ohrid has ranged from a high of 165 tonnes (in 1992) to a low of 302 tonnes (in 1988), averaging about 225 tonnes. Most of the catch is composed by Ohrid trout, belvica, and plashica, all of which are endemics. According to the data of Spirkovski and Talevski (1992), the age and sex structure of the Ohrid trout population has changed and its density has been reduced. A major reason for these changes is waste water, which is destroying natural fish-breeding places and killing the organisms that feed the fish. A second reason is the excessively lengthy fishing season, especially on the Albanian side of the lake. Still a third reason is the presence of several introduced fish species, such as gambusia, carassius, rainbow trout, and alosa, which compete for food with the endemic fish of the lake.

C3. Lake Dojran

Lake Dojran, situated in the southwest, is the smallest tectonic lake in Macedonia (43.1 km²). It is a shallow lake, only several meters deep in its deepest part. The Lake Dojran basin was created during the young Pliocene period, while the lake was created in the Pleistocene period. Actually, Lake Dojran is a relict reminder of the former Pleistocene Lake Peon, which once occupied about 127 km².

Lake Dojran is an eutrophic lake, rich in plant and animal life. The most abundant plants are the blue-green algae (*Cyanophyta*). During August and September, they cover the entire lake surface with water bloom. Animal life is represented by 23 crustacean and several shell species. Due to the high production of plankton, Lake Dojran is rich with fish species. Of the 15 species that live in Lake Dojran, 4 are endemic. The annual catch is about 500,000 kg, or 150 kg per ha, one of the highest freshwater productions in Europe. Freshwater crab (*Potamon ibericum*) is present in significant quantities.

Like the other lakes, Lake Dojran is a transboundary area, between Macedonia and Greece. Unfortunately, as is the case in many transboundary situations, the two countries vary greatly in the attention they give to managing the lake. Macedonia, a small land-locked country, assigns high priority to the management of the lake, while Greece gives it a much lower priority.

The level of Lake Dojran has dropped considerably during the last 10 years, endangering individual lake zones and groups of species. The drying up of the reed belt first threatened the birds because the reed belt was their most important nesting place. Fish and wildlife populations

have also been severely affected. The littoral zone has undergone the largest changes and many algal species, endemic to the lake, have vanished. For example, 109 out of 257 algal taxons previously present in the lake are now extinct. The main reason for these disappearances was some extraordinarily dry years and the over-exploitation of the water for irrigation by both the Macedonian and Greece.

Unfortunately, all the adverse influences that were mentioned for the Lake Ohrid are present in this lake as well. Consequently, the same measures need to be put into place to protect the lake, including extending the collector system and ensuring its maintenance and regular functioning.

Measures to Protect Macedonia's Three Natural Lakes

Macedonia's three natural lakes can be protected by:

1. Implementing the existing laws for the protection of these lakes (regarding urbanization, communal waste, coastal zone, and exploitation of mineral resources)
2. Implementing UNESCO's requirements for Lake Ohrid as a World Heritage Site
3. Implementing Ramsar Convention requirements for Prespa Lake or the Ezerani reserve
4. Establishing a Council for Protection of the Lakes to carry out obligations toward corresponding international organizations and to support the implementation of Macedonia's own legislation
5. Improving the existing collector systems and ensuring their correct functioning
6. Conducting a feasibility study for re-establishing the natural migration route of the eel (*Angela anguilla*) back to Ohrid Lake

D. Forest Management

Approximately 40 percent of the country is covered by forest reserves (1 million ha). However, less than 29 percent of the forest reserves are actually covered by solid forests. Low dendriform and degraded forests occupy the remaining 71 percent of the forest area. This poor quality of forest reserves is worrisome.

Forest Fires

In 2000, forest fires destroyed an estimated 5 percent of existing forest stock. The increasingly drier climate over the last several years presented greater opportunities for forest fires. In general, the public hears little about the need to prevent forest fires, which often are ignited by cigarettes or other careless actions. The biggest obstacles to dealing with forest fires once they are started is proper communication and transportation equipment. For example, in Pelister National Park, three forest fires were ignited during the year. Due to adequate equipment, up-to-date radios and vehicles for all eight rangers, they were able to respond to each of the fires within 15 minutes. In many forest areas, rangers lack the ability to respond due to the lack of these resources. In addition, forestry officials stated that technical assistance on developing a system for managing forest fires is much needed. In principle, forestry staff believed that they were well trained to deal with forest fires but that they were limited by their inability to get to the fires in time.

In terms of biodiversity conservation, forests are important because the area allocated for forest reserves is five times larger than that for protected areas. Hence, much of Macedonia's biodiversity is concentrated outside protected areas. The forests are also the most significant

natural resource in the system of maintenance, restoration, and promotion of primary natural resources (water, soil, and air). In addition to watershed protection, forests play important roles in the production of wood, mushrooms, medicinal plants, berries, and other products and in hunting, tourism, and recreation.



As a result of Macedonia's location at a geographic crossroads, there is wide diversity of dendroflora, with over 300 species present, of which 16 percent are Balkan endemics. Forests comprise pure broadleaf stands, mostly oak and beech (550,000 ha), mixed broadleaf stands (288,000 ha), pure conifers — mostly Austrian Pine and Scotch Pine (83,000 ha), mixed broadleaf/coniferous stands (47,000 ha), and mixed coniferous stands (8,000 ha).



Macedonia is in the process of returning state forestlands to private ownership. Although the privatization process is nearly complete, privately owned forests make up no more than 15 percent of the entire forest stock of the country. Forests that have not been privatized yet or that cannot be returned to their previous owners will remain under state management. Thus, the state will continue to own most of the forest resources.

The role of public enterprises in forestry management is still unclear. To date, state management has been inefficient. In addition, assistance is required to improve marketing efforts of forest products and services. In the future, more of

the management of state forests may be concessioned out to private enterprises and community and local associations. Currently, managers have little incentive to manage the forest more effectively because they would not benefit from additional efforts.

As Table 2 shows, over 90 percent of the forests are classified as economic. It has been recommended that forests be reclassified under the New Forest Law. Although large portions of forest are shown as economic, timber harvest is actually below the sustainable level, increasing forest stock.

Table 2. Types of Forests by Purpose

Type of forest	Area	
	ha	Percent
Public economic forests	859,427	82.90
Private economic forests	106,427	10.24
Forests in national parks	43,589	4.20
Protected forests	17,617	1.70
Recreational resorts	1,101	0.10
Other forests	8,897	0.86

E. Hunting and Hunting Areas

Forests are critical areas for wildlife. Some 62 species are protected; 46 species are restricted to an “open season”; and 22 species are unprotected. In addition to hunting areas in forestlands, more than 132 hunting areas exist on non-forested lands. Hunting is managed by the country’s 137 hunting associations. A new law for hunting will improve management, but concessions have not been established or distributed. The hunting management program may need to be revised to make hunting practices more sustainable. However, hunting is generally viewed as no significant threat to biodiversity conservation. With that said, figures presented in the National Environmental Action Plan (NEAP) show that the number of animals is only 7 percent to 25 percent of the expected number. (See Table 3.)

Table 3. Number of Hunted Animals Recorded for 1994 and Number of Animals Estimated to Exist in 1996

Type of Animal	No. of Hunted Specimens	Estimated No. of Specimens	Type of Animal	No. of Hunted Specimens	Estimated No. of Specimens
Red deer	2	300	Brown bear	27	170
Fallow deer	8	400	Wild boar	695	2,850
Roe deer	8	5,550	Rabbit	16,830	23,000
Chamois	37	1,770	Partridge	25,385	19,100
Mouflon	2	300	Rock partridge	1,645	5,300

IV. Strategy and Policy Framework

A. Policy Framework

The NEAP, completed in 1997, serves as a basic strategic document in for protection and promotion of the environment. It defines priority activities, defines the problems, and suggests ways to improve conditions in the short term, medium term, and long term. NEAP priorities related to biodiversity include:

- Improving management of Lakes Ohrid, Prespa, and Dojran
- Renewing and preserving forests
- Strengthening the ability of institutions to manage the environment
- Developing improved management plans for protected areas

Although the NEAP needs to be revised and updated, it represents a first step to Macedonia's long-term ambition to integrate with the European Union. It is an important document that is based on European environmental standards and regulations.

Last year, a National Committee for National Biodiversity Strategy was founded within the framework of the Ministry of Environment. The committee has prepared a draft report for preparing a National Biodiversity Strategy, which has been submitted for funding from the World Bank.

B. Legislative Framework

B1. Laws

Macedonia's constitution establishes the fundamental values of the state. It establishes the protection of the environment as a basic constitutional right (Chapter 8). It also establishes the right of every citizen to a healthy environment and the obligation of every citizen to protect the environment (Chapter 43). In addition, the constitution establishes that all natural resources of the state, like the objects of special cultural and historical importance, belong to all citizens of the state and, therefore, enjoy special protection. In short, the constitution establishes that protection of the environment and of human health are fundamental values that must be reflected in the country's economic policy.

Following the NEAP recommendations, the Council of the Republic of Macedonia established in December 1996 the Environmental Protection Law. This law establishes measures for protecting the air, water, and land from pollution; preventing harmful noise; placing under special protection the natural goods and objects of nature; protecting human beings from radiation; and disposing of waste. Some specific actions authorized by this law are the following:

- Creating a data base that will provide data not only for protecting the environment but for establishing wider government policies
- Establishing ecological plans for each municipality, identifying the specific environmental problems in that municipality and the solutions to those problems

- Designing qualitative technical documentation that will eliminate the sources of pollution
- Forbidding the production and trade of products temporarily or permanently if they threaten the environment or, human health
- Establishing standards for products sold as “eco-products”
- Establishing an Environmental Protection Fund
- Establishing an inspectorate created of inspectors from different areas of the country who will supervise the protection of the environment and who will have the power to impose severe penalties on those who break environmental laws

Other laws relevant to biodiversity conservation include the following:

- Protection of Natural Rarities (1973)
- Protection of Lakes (1977)
- National Parks (1980)
- Regional and Urban Planning (1985, amended 1990)
- Forests (1974)
- Waters (1981)
- Fishing (1983)
- Hunting (1988)
- Management and Use of Pastures and Abandoned Fields and Meadows (1974)
- Geological Investigations and Exploitations of Mineral Resources (1988)
- Construction Investment (1990)

Because other laws from related sectors can amend these laws, problems can result when they come in conflict.

B2. International Conventions

Macedonia has ratified several major international conventions in the field of biodiversity conservation. They include the following:

- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus), 22 July 1999
- Convention on Biodiversity (CBD), 2 December 1997
- Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), 4 July 2000
- Convention on the Conservation of European Wildlife and Natural Habitats, 17 December 1998
- Convention on the Conservation of Migratory Species of Wild Animals, 1 November 1999
- Convention Concerning the Protection of the World Cultural and Natural Heritage, 30 April 1997

- Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 8 September 1995
- Convention on Environmental Impact Assessment in a Transboundary Context, 31 August 1999
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 16 February 1997
- Vienna Convention for the Protection of the Ozone Layer, 10 March 1994
- Convention on Long-Range Transboundary Air Pollution, 17 November 1991
- Framework Convention on Climate Change, 28 January 1998

In addition, Macedonia has also signed agreements of cooperation in the field of environmental protection with Albania and Greece. Most recently, on February 2, 2001 – World Wetlands Day – Prime Ministers from all three countries declared “Prespa Park” a new trilateral transboundary protected area. At this signing, they recognized that conservation of nature depends largely on respect for international legal agreements that aim at protecting natural environments. The three governments pledged themselves to the environmental protection and sustainable development of the Prespa Lakes and their surrounding areas. All three countries are contracting parties to the Ramsar Wetlands Convention, and they have each declared Prespa a Ramsar-Protected Site. The prime ministers declared, along with the secretary general of Ramsar, Prespa Park to be the first transboundary protected area in Southern Europe and presented this collaborative initiative as a “gift to the earth” in the context of the World Wildlife Fund’s Living Planet Campaign. This campaign aims to conserve the world’s most important biological resources and ecosystems into the next millennium.

C. Institutional Framework

C1. Government of Macedonia

Formerly part of the Ministry of Urban Planning and Construction, the Ministry of Environment was established in 1999 as a separate ministry. It was established to implement NEAP recommendations and to implement the Environmental Protection Law. The Ministry of Environment has broad authority for monitoring, protecting, and improving the environment in the areas of water, soil, air, noise, radiation, and biodiversity.

The creation of a separate organ in the state administration is, in general, a positive step. However, some fear that the new ministry will promote the re-centralization of environmental management, rather than its decentralization. The basic aims and assignments of the ministry are:

- Monitoring environmental conditions
- Protecting the water, soil, flora, fauna, air, and ozone layer from pollution
- Protecting national parks and protected areas from noise and radiation and protecting biodiversity, and geo-diversity in these areas
- Restoring polluted areas of the environment
- Suggesting measures for handling waste
- Planning spaces
- Maintaining the space-information system
- Supervising the areas that are its responsibility

The Ministry of Environment consists of the following administrative units:

- State Inspectorate of Environment
- Office of Environment
- Space Information System Office
- Administration for the Registration of Real Estate

The Environmental Protection Fund was established in 1998 to finance projects aimed at protecting the environment. This kind of financial institution is important in determining investment policy in countries in transition. Until the Law of Organization and Work of the State Administration Organs was established, the Environmental Protection Fund existed as a branch of the ministry. According to the Environmental Protection Law, the basic aim of the fund is to provide financing for preventive measures and to establish sanctions to protect the environment.

C2. Other Institutions

Numerous other organizations are involved in environmental protection and biodiversity conservation:

- Academic institutions play a major role as technical advisors for environmental issues.
- NGOs focus primarily on awareness and advocacy but also on management and community initiatives.
- The media plays an important advocacy role.
- The private sector has to date played a minor role in biodiversity conservation, though it has a possible role in preventing the uncontrolled collection of medicinal plants.
- Donors include GEF, which has a project in Ohrid, and KFW, which has expressed interest in Prespa, as well as Friends of the Earth, IUCN, World Bank, and USAID. In addition, many donors are focused on democracy, governance, and economic growth activities, which also have an impact on diversity conservation. However, awareness of these opportunities is limited.

C3. Regional Environment Center

The Regional Environment Center for Central and Eastern Europe (REC) is a non-advocacy, nonprofit organization. Its mission is to help the region solve environmental problems. The REC achieves its mission by encouraging cooperation among NGOs, governments, and businesses; supporting the free exchange of information; and promoting public participation in environmental decision-making.

V. Summary of Findings



The following are the major findings of the Chemonics team regarding their assessment of biodiversity in Macedonia:

1. The NEAP is in place, and parts of it have been implemented. A much-needed national biodiversity strategy will soon be developed.
2. A modern legislative framework has been developed for biodiversity conservation, particularly for protected areas and forests. Implementation of this legislation is now needed.
3. Environmental awareness and education has improved in the last few years. The previous Minister of Environment was quite outspoken in the media, which raised public awareness. Also, the United Nations Development program and the Ecologists Movement provide general education about the environment, although it is not specifically targeted at biodiversity. Needed efforts range from improving the understanding of biodiversity conservation and its importance in economic and social development by decision makers and politicians to linking biodiversity conservation to the immediate day-to-day needs of local populations. Most members of parliament know little about biodiversity. It is hoped that the creation of the Ministry of the Environment will increase environmental awareness among decision makers and politicians.
4. The Ministry of Agriculture, Forestry and Water Resources has no biologists and ecologists on its staff. Although the ministry solicits help from biodiversity specialists at universities and other institutions, it needs to have such specialists as members of its permanent staff to

help integrate environmental concerns, including biodiversity conservation. Well-planned agriculture, forestry, and water-management programs could significantly improve biodiversity conservation. In addition, the opportunity exists to develop and expand organic farming and agrobiodiversity conservation, not only in Macedonia but also in neighboring countries. A proper institutional analysis would help determine strengths and weaknesses in the department. A similar situation exists in the national parks, where forest engineers make up most of the staff, and biologists or social scientists are few.

5. Macedonia has inadequate information on many species in many areas. For example, information is good on species at higher elevations but inadequate for those in the Mediterranean low lands like the Vardar River Valley. Information on vertebrates is good but lacking for some groups of invertebrates. Only those groups that have received the attention of specialists have been well-studied. For example, information on butterflies, crustaceans, and gastropods is good because specialists have studied these groups. However, only a few species of ants and other insects have been identified because no one has studied them. Macedonia's plants are the least understood, with only two people devoted to the study of flora. However, some forestry experts are addressing dendrology, though vascular plants are excluded. Habitat and ecological community data could usefully be developed as a broad conservation tool to complement species information in determining which sites are especially important for conservation. Most of Macedonia's scientists are taxonomists, because it costs more to do broader work. Taxonomists seldom need to go back to a site, and they need less expensive equipment. In many natural areas, the baseline and subsequent biophysical monitoring are insufficient.
6. To improve planning, policy-making, and monitoring, government agencies need to better define their respective roles and responsibilities, to establish procedures for sharing information, and to streamline their operations. Coordination between the relatively new Ministry of Environment with the Ministry of Agriculture, Forestry and Water Resources is especially important.
7. Government systems remain highly centralized.. The government needs to improve support to decentralized authorities and to develop new partnerships with local groups and communities. The government needs to address the problems that the re-centralization of national parks causes.
8. Environmental NGOs specializing in biodiversity conservation are still relatively new in Macedonia. Those that exist have played an important role in raising awareness and commitment to biodiversity conservation within certain sections of the public. More remains to be done in coordinating the efforts of NGOs and supporting their efforts to increase awareness and education, advocacy and lobbying, information gathering and sharing, and developing on-ground initiatives supporting community-based organizations and local communities.
9. Transboundary issues are of critical importance to biodiversity conservation in Macedonia. Greater regional cooperation needs to be encouraged.

10. The private sector has had a limited role in biodiversity conservation in Macedonia. Opportunities for private-sector involvement in biodiversity conservation include developing ecotourism and initiatives for the sustainable management of forests, hunting reserves, and protected areas.
11. Macedonia's natural features and climate makes it an ideal location for the promotion of nature-based tourism because it offers a great diversity of attractions in a small area. Within just a few hours (just 20 minutes in some areas), one can go from skiing in the Alps to hiking around the Mediterranean lakes. Some European organizations have already begun to study how Macedonia might be integrated into a wider pan-European hiking system. The lakes have attracted European visitors for many years, but their numbers and the length of their stay could be increased. Furthermore, Macedonia offers many magnificent and rich historical and religious sites. Other tourist attractions include its vineyards and wine tours. Developing ecotourism in Macedonia would promote private-sector involvement in biodiversity conservation, as well as general economic growth.
12. Macedonia currently does little to promote tourism. However, some local government authorities, like those in Ohrid (which is a UNESCO World Heritage Site – both for its natural and historic features), have tourism as one of their most important priorities because they see tourism as a mechanism for generating sustained economic growth. Macedonia could benefit from support to the tourism industry from both the private sector and through government institutions. Some local government authorities, like that of the Town of Ohrid (which is a UNESCO World Heritage Site – both for its natural and historic features), have tourism as one of the most important priorities and mechanisms of generating sustained economic growth. In the national parks are few interpretation facilities or services, and although in some parks hiking trails exist there are significant opportunities to expand the number and quality of services offered to visitors.
13. Macedonia could take additional steps to generate revenues in natural areas. For example, no entry charges are applied to visitors of any of the natural areas (except for hunters). In addition, no concession fees or taxation are levied on any of the users of the protected areas, such as ski resorts and visitors, holiday homeowners, and other recreational users. Similarly, people who use water from the watershed pay no fees for the maintenance of the watershed.
14. Macedonia also has many nature-based industries that could be developed. For example, many Macedonians supplement their incomes by harvesting wild fruits and pine cones in many of the forest areas and in all the national parks. However, they do not market their products outside their local areas. Some of these products have a high value on international markets, like the Molecca pine cone, which sells for \$4.50/kilo (vs. \$0.30-0.50/kilo for regular cones). Also, local forest offices, like that in Bitola, have factories for the production of essential oils. However, these factories are currently producing even below previous levels and far below optimum capacity.

VI. Recommendations for Biodiversity Conservation

Based on its assessment of biodiversity in Macedonia, detailed in this report, the Chemonics team makes the following recommendations to Macedonia:

1. Improve coordination and communication between the Ministry of Environmental Protection and the Ministry of Agriculture, Forestry and Water Resource Management. Clarify who is responsible for planning and managing areas. Integrate biodiversity outside of protected areas into the overall planning and management of natural resources. This coordination will also improve allocation of limited resources.
2. Develop, implement, and fund plans for managing existing protected areas and improving management's ability to carry out the diverse functions required.



3. Develop and implement measures to conserve the three lakes and to allow for their sustainable use.
4. Determine what additional skills and procedures are required to address transboundary aspects of conservation for all three lakes and other protected areas.
5. Establish a network of protected areas that represent the various ecosystems in Macedonia. Currently the network is heavily skewed toward forested-mountain ecosystems. Although

these ecosystems have a great biodiversity, they are representative of only one portion of Macedonia's diversity. Macedonia could well model this network after existing international systems.

6. Address economic and social aspects of biodiversity conservation. Developing local community involvement and social approaches to collaborative management require certain skills that are seldom found in NGOs, ministries, or academic institutions. People and their behavior are the issue, and this issue needs more attention. With appropriately trained individuals, pilot initiatives on community participation can be developed with links to democracy and governance.
8. Pursue Shar Planina as an interesting and challenging case of transboundary collaboration and domestic collaborative management.
9. Develop and implement the National Biodiversity Strategy, focusing on the integration of nature conservation and biodiversity into approaches for sustainable economic development in agriculture, forestry, tourism, water management, and transportation.
10. Make donors aware of biodiversity by linking it with ecotourism and business development and with democracy and governance issues.
15. Encourage certain NGOs and private-sector participants to be more engaged in biodiversity conservation, especially NGOs able to take on management initiatives.

VII. USAID/Macedonia

A. Impact of Program

The Macedonia Mission's program is generally neutral with regard to biodiversity conservation. However, the Mission has many opportunities to act in a way that will have a positive impact on biodiversity. To succeed, project implementers will need to see biodiversity conservation as an additional objective in carrying out development programs. Other existing program activities — such as tax policy, judicial reforms, cost of borrowing, and micro-lending — will most likely have a positive secondary impact on biodiversity conservation.

The Mission strategic objectives include the following:

- Accelerating development and growth of the private sector (Strategic Objective [SO] 1.3)
- Increasing informed-citizen participation in political, economic, and community decision-making (SO 2.1)
- Helping local governments become more effective, responsive, and accountable (SO 2.3)
- Establishing legal systems that support democratic processes and market reforms (SO 2.2)

The U.S. government should take direct action to conserve biodiversity in Macedonia because many species are found only in Macedonia or the Balkans. For some groups, the endemism is as high as 90 percent. In addition, although Macedonia is a geographically small country (roughly the size of Massachusetts or Vermont and a bit smaller than Maryland in the United States), it has 42 percent of all the mammal species and 68 percent of all the bird species in Europe. The bird representation is all the more significant considering that Macedonia does not have a coastline with its associated species. It is therefore recommended that USAID Macedonia make biodiversity conservation a strategic objective.

Programmatic and funding constraints, competing political priorities, and existing and on-going activities may make the above recommendation unrealistic. However, the Macedonia Mission can do something about biodiversity conservation, as mandated by Section 119 of the FAA, even within its existing strategic framework. In the extreme, almost all USAID program activities could be implemented with a primary focus on biodiversity and still achieve current objectives. By ensuring that existing programs contain biodiversity components, the Macedonian Mission can indeed have a more direct and positive impact on biodiversity conservation. These initiatives by USAID can be either independent actions as opportunity allows or a comprehensive program, once again within the existing structure.

A biodiversity program might take a combination of approaches focusing on:

- Regional or geographic areas, like Lake Ohrid
- Themes or sectors across the country, such as tourism or development and marketing of nature-based resource products

- Organizations or institutions, with a focus on strengthening conservation organizations, whether they be NGO, private sector, local government, or national government organizations

The biodiversity program would be a nested set of activities carried out within existing strategic objectives, yet crosscutting among the objectives. What this program might look like specifically for the Lake Ohrid area is outlined below:

- **Accelerating Growth and Development of Private Sector.** USAID could work with private-sector businesses to promote tourism and the marketing of nature-based products to accomplish its objective to accelerate growth and development of the private sector. Nature-based products could easily be an “industrial cluster,” supported by existing and planned programs. Nature-based products offer numerous chances for increased economic growth. Because most of these products are located in rural areas, support for these initiatives would also diversify the sources of economic growth outside urban areas, which now serve as magnets. Management systems and practices could also be improved with an eye toward the management of natural resources. USAID could also work with park authorities to enhance the management of the parks.
- **Increasing Informed-Citizen Participation.** USAID could work with the NGOs and community groups that have as their key objective the conservation of Lake Ohrid and its biodiversity. Supporting these groups would encourage informed citizens to participate in existing projects, like the World Bank GEF Lake Ohrid project, or in local government management efforts for the lake.

For many citizens of Macedonia, helping manage natural resources is often their way to play an active role in civil society and to feel a sense of control and empowerment through the devolution of management responsibility and decision-making. This is especially true in rural areas where most of the natural resources are. Devolution and participation around natural resources can be a powerful means of promoting democracy and governance objectives, as has been shown in other countries around the world. Another means of increasing opportunities for citizens to participate is through support of the media. The media plays a significant role in Macedonia by questioning existing power and increasing access to objective and unbiased information.

Efforts to promote decentralization, instead of “re-centralization,” of natural resource management, would increase acceptance of democratic values. Similarly, allowing NGOs, associations and other groups to have a voice in decision-making about and management of natural resources would have many benefits.

As a first step, USAID could broaden the discourse on the new national park legislation. The legislation is currently being drafted to centralize management of national parks so that financing and management practices would not be market-based. Existing managers and other stakeholders have had little part in the review and design of the new legislation. Promoting venues and mechanisms to allow for participation in the design of this one piece

of legislation could have direct and significant positive impacts on biodiversity conservation and its management.

- **Helping Local Governments Become More Effective, Responsive, and Accountable.** The local government of Ohrid is striving to become more effective, responsive, and accountable. It is focusing on the conservation of Lake Ohrid and its watershed and the promotion of related tourism. Ohrid hopes to serve as a center for tourist information and promotion, not just for itself but for the whole country. USAID could support biodiversity objectives by providing local government assistance to Lake Ohrid.

In addition, any systems that could be developed to establish a decentralized system of local finance would promote more sustainable management of natural resources. If the Lake Ohrid area generates revenues from tourism, fishing, and other types of natural resource-based businesses, it should be able to use most of these revenues to manage those resources. There is an obvious concern that revenues generated from natural areas could be centrally channeled through Skopje, and that little would be returned to local areas. To gain support for management, local communities need to have revenues to be able to support management, and they need to see that they will benefit from the sustainable management of natural resources.

- **Establishing legal systems that support democratic processes and market reforms.** NGOs and individual citizens in Ohrid are interested in taking legal action to protect Lake Ohrid from extensive and unplanned tourism developments and from industrial, domestic, and agricultural waste flowing into the river. USAID initiatives to support, track, or monitor complaints and cases put forward in the legal system specifically related to Lake Ohrid would help achieve not only its objective to improve civil society in general but also the objective to conserve biodiversity.

B. Recommendations for USAID/Macedonia

Based on meetings with USAID and a review of the draft strategic plan for USAID, the Chemonics team makes the following recommendations. Although these recommendations are low-cost, they could have high impact. In addition, they might put organizations in a better position to leverage funding provided by the World Bank, KFW, and other donors. Although the recommendations focus on biodiversity conservation, they are all in line with supporting the accomplishment of existing or planned strategic objectives.

1. Support environmental education and awareness, highlighting the uniqueness and importance of Macedonia's biodiversity. Create awareness among donors of Macedonia's unique biodiversity. Become aware of activities and opportunities in biodiversity conservation, including involvement in any relevant donor coordinating bodies for biodiversity conservation.
2. Provide market-oriented support to economic growth for natural-resource-based businesses . Develop a strategy for marketing products derived from natural resources, such as wild fruits and pine cones. Provide expertise for the extraction, production, packaging, and preparation of essential oils for export.



3. Provide technical assistance and training to state environmental agency staff. Strengthen the professional civil service, especially the newly established Ministry of Environment by including social scientists and biologists on the staff. Keep the national parks decentralized and discourage efforts to re-centralize them within the Ministry of Environment.
4. Promote initiatives to enhance environmental NGOs, which will promote greater local control over resources, enhance accountability of central authorities, make management more accountable, and increase access to and distribution of benefits from natural resources. Make NGOs concerned with biodiversity part of the core group of NGOs that USAID works with to achieve its strategic objectives.
5. Address issues of control of resources and decentralization of management of natural resources by (1) supporting a community-based pilot project or initiatives that support other strategic objectives as well and (2) privatizing existing state-run operations dealing with natural resources. Even if ownership of the land is not privatized, privatizing the harvesting, production, marketing, and distribution of products derived from natural resources would greatly benefit devolution and economic growth.
6. Promote regional collaboration and transboundary initiatives to enhance the quality of resource management, create economies of scale, stimulate other synergies, and address issues of ethnic tension. Such collaboration is critical for the management of the lakes to the south, which extend into several countries. Also, establishing Shar Plania National Park in the north could integrate ethnic minority populations and give them an enhanced sense of empowerment.

ANNEX A

Sections 117 and 119 of the Foreign Assistance Act

ANNEX B

Scope of Work

Objective

The objective of this task order is to conduct country-wide assessment of bio-diversity resources and their status for the purposes of complying with sections 117 and 119 of the Foreign Assistance of 1961, Agency guidance on country strategy development, and USAID Environmental procedures described in Title 22 CFR, Section 216.

Background

A. Policies Governing Environmental Procedures

USAID's environmental compliance is directed by U.S. policy and law. The Foreign Assistance Act (FAA) of 1961, Section 117, requires that the President take fully into account the impact of foreign assistance programs and projects on environment and natural resources (Sec. 117 © (1)). Current USAID Legislation which guides environmental impact and monitoring is Title 22 of the Code of Federal Regulations, Part 216 ("Reg. 216"). In complying with the law, USAID provides its environmental Procedures under ADS 204.5 to ensure accordance with the requirements of Title 22 CFR 216.

Section 119 of the FAA related to Endangered Species states that "the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems and through the protection of wildlife habits should be an important objective of the United States development assistance (FAA, Sec. 119 (a))." Furthermore it states that "Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified (FAA, Sec. 119(d))."

For USAID Missions to be in compliance with the above, and for USAID Missions to effectively determine impact on natural resources and endangered species and incorporate mitigation measures in their programs, a bioiversity assessment is needed to inform Mission planning. The purpose of this Task Order is to provide USAID/Macedonia with this information.

B. USAID's Program in Macedonia

USAID's assistance to Republic of Macedonia began in 1992 with the provision of humanitarian assistance, primarily food for Bosnian and Croatian refugees and medical supplies for the Macedonian population. In 1993, USAID initiated development activities in democratization (political party capacity, media training, rule of law), privatization, and a farmer-to-farmer program. In 1994 and in subsequent years, these activities were expanded considerably and assistance was provided in tax reform, private sector development, bank reform, NGO development, legal reform and additional democracy-related activities. The Kosovo Crisis

interrupted some of these developments during 1999. There are of course now new opportunities that have stemmed from the Kosovo crisis, and that have been catalyzed further more recently with the fall of Milosevic in Serbia. Macedonia has very recently become the first country in the region to sign a Stabilization and Association Agreement with the EU. This has the immediate effect of increasing access to the EU market. It will also support the Government of Macedonia (GOM) in continuing to move economic and political reforms forward in line with its aspiration to become an EU and NATO member.

Macedonia came out of the Kosovo crisis better than many expected, but the stress that the crisis placed on the country highlighted some fundamental weaknesses in its democratic institutions, processes and civil society. Ethnic tensions among ethnic Macedonians, Albanians and Serbs have calmed since the crisis, but tensions will continue to be affected by developments in Kosovo, Serbia and Montenegro. New activities supported through increased SEED funding, including community self-help and labor redeployment, provided appropriate means for strengthening the stability of Macedonia during and after the crisis. It is also important to note that while the economy continues to pick up, official employment statistics have so far changed little and at least the official unemployment figures remain stagnant. In addition, progress in structural economic reforms, particularly in public administration and privatization/enterprise restructuring, will generate additional unemployment in the short term.

USAID/Macedonia is currently in the process of finalizing the update of the strategic plan which will guide its program through 2004. USAID/Macedonia is addressing the following objectives: economic restructuring, democratic development and quality of life. In light of substantial involvement by other donors in quality of life areas, USAID emphasizes the first two. The key objectives under these goals include:

- *Stimulating the Private Sector* by attracting foreign investment, regional cooperation and facilitating trade, supporting private business and agribusiness associations, developing micro-lending and rural savings, financial sector reform and international accounting standards.
- *Developing the Framework for a Market Economy* by assisting the government in WTO Accession, promoting sound market-oriented banking systems, implementing capital market and legal reforms which impact on the private sector and domestic and foreign investment.
- *Fostering Democratic Systems* by increasing Parliament's capacity to serve as an independent, representative and democratic institution, expanding the organizational capacity of an increased number of NGO's to participate in the democratic process at local and national levels, supporting election reform efforts and contributing to inter-ethnic dialogue.
- *Decentralization and Strengthening of Local Government* by facilitating reforms in major laws affecting the authority, responsibility and systems of financing of local governments, improving local managerial capacity to deliver services, increase revenues and promote citizen participation.

Scope of Work

The Contractor shall perform the following activities:

- a) Pre-travel informational meetings and information gathering prior to travelling to the field, contractor is expected to :
 - 1) Hold meetings with Bureau Environmental Officers (BEO) of E&E Bureau in Washington, to ensure full understanding of USAID environmental procedures and the purpose of this assignment.
 - 2) Gather existing relevant background information on Macedonia's natural resources base and begin identifying organizations and donors involved in the sector.
 - 3) Meet or speak with key stakeholders or managers at the World Bank, NGOs or other organizations involved in biodiversity conservation in Macedonia or relevant regional efforts in the CEE.
- b) Field a team to conduct an overview and general analysis of the country's bio-diversity and its current status. Upon arriving in Macedonia the team will:
 - 1) Meet with USAID/Macedonia to get a solid understanding of Mission program goals and objectives under its updated strategy; perspectives of this assignment and specific interests for the team, including advice and protocol on approaching USAID partners and host country organizations with respect to this assignment. The team will discuss organizations to be contacted and any planned site visits with the Mission and coordinate as required.
 - 2) Hold meeting with Donors, NGOs, relevant government agencies, and other organizations knowledgeable about biodiversity conservation, and gather information locally.
 - 3) If necessary conduct one or two priority site visits that would help supplement understanding of interviews and literature.
- c) Prepare a report on the status of bio-diversity review and conservation efforts in Macedonia and implications for USAID or other donor programming and environmental monitoring which shall define the actions necessary for conservation. The report shall include descriptions of:
 - Major ecosystem types highlighting important, unique aspects of the country's biodiversity, including important endemic species and their habitat.
 - Natural areas of particular importance to bio-diversity conservation, such as forests, wetlands, coastal areas critical for species reproduction, feeding or mitigation, of relevant.
 - Plant and animal species which are endangered or threatened with extinction. Endangered species of particular social, economic or environmental importance should be highlighted and described, as should their habitats.

- Recent, current and potential future primary threats to bio-diversity whether they are ecological (i.e. fire), related to human use (i.e. agriculture, contamination), or institutional (i.e. failed policy) or trans-boundary issues as appropriate.
 - A specific sub-section devoted to the damage of forest fires during the summer of 2000.
 - Conservation efforts including their scope and effectiveness. This should include recent, current and planned activities by donor organizations which support bio-diversity conservation, identification of NGOs, universities and other local organizations involved in conservation, and a general description of responsible government agencies.
 - USAID's program in general and, if relevant, 1) any perceived potential areas of concern related to bio-diversity impact with current or planned program activities, or 2) any potential opportunities for USAID to support bio-diversity conservation consistent with Mission program goals and objectives. Particular attention should be paid to eco-tourism opportunities, especially in coastal areas.
- d) Prepare a one to two page summary or overview on the status of bio-diversity and conservation efforts in Macedonia and implications for USAID or other donor programming and environmental monitoring which shall define the actions necessary for conservation. The summary will be based on the assessment conclusions. This overview will be included in the bio-diversity section of the USAID/Macedonia Strategy.

Methodology

The Contractor shall field a two-person team for this assignment. One team member should be a bio-diversity specialist or practitioner with international, regional or in country experience. The team leader should be an Expatriate senior-level professional with USAID experience and significant experience in international conservation programs and environmental impact assessments. Experience in the region or in-country is preferred. The second team member shall be a qualified Cooperating Country National (CCN) natural resources or bio-diversity professional.

Deliverables

The first deliverable under this task order is a report addressing the points specified in the statement of work, not to exceed 30 pages. The report will contain at a minimum one map which provides a broad picture of key eco-systems, habitats and protected areas, one annex containing IUCN lists for endangered and threatened species, and one annex containing Sections 117 and 119 of the Foreign Assistance Act. A draft report is due to USAID/Macedonia for comments no later than March 30, 2001. The final report is due in Macedonia no later than April 30, 2001. Two hard copies and one electronic copy in Word format of this assessment shall be provided to the USAID/Macedonia Mission control officer as well as the E&E Bureau Environmental Officer.

The second deliverable is a one to two-page "overview" of the sector based on assessment conclusions. This overview will be included in the bio-diversity section of USAID/Macedonia Strategy. This overview is due no later than March 30, 2001.

The third deliverable is an in-country Mission exit briefing.

Reporting Requirements

The Contractor shall report to the Mission control officer or his/her designee in Macedonia for the overall assignment, and copy Alicia Grimes, Forestry and Biodiversity Advisor, EE/EEST/ENR on all correspondence and deliverables.

Anticipated Level of Effort

The LOE for this assignment is 35 workdays for U.S. specialist and 22 workdays for Cooperating Country national as follows:

- Information gathering and meetings in Washington with USAID BEO, WB, NGOs and other as relevant. (US Specialist 3 days)
- Field assessment, analysis and Mission debriefing (22 workdays).
- Report preparation (including incorporating USAID comments (10 days) in Washington.

Schedule: Work under this task order shall start immediately after its signing. Upon signing this task order, the contractor shall coordinate with the Task Order CTO in Macedonia to establish a window for the field assessment with the USAID Mission. A final schedule shall be developed for this task order and delivered to the CTO as soon as possible after the signing of the task order.

Logistics: The Contractor will coordinate logistics with the Mission control officer or its designee. The Mission will assist the Contractor by providing key references, documents and contacts available in country as well as advise on local transportation and interpretation services, and protocol in interacting with host country institutions and partners.

ANNEX C

People Contacted

Faculty of Natural Sciences and Mathematics, Institute of Biology - Skopje

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|---------------------------|--|
| 1. Ljupco Melovski, Ph.D. | President of the Macedonian Ecological Society |
| 2. Branko Micevski, Ph.D. | President of the Bird Study and Protection Society of Macedonia; Team Leader for National CORINE |

Faculty of Forestry - Skopje

- | | |
|----------------------------------|---|
| 1. Aleksandar Trendafilov, Ph.D. | Prof. of the Department of Soil erosion and torrent control |
| 2. Ivan Blinkov, Ph.D. | Prof. of the Department of Soil erosion and torrent control |
| 3. Nikola Nikolov, Ph.D. | Prof. of the Department of Plant Protection |
| 4. Radovan Rizovski, Ph.D. | Prof. of the Department of Phytocenology |
| 5. Aleksandar Andonovski, Ph.D. | Prof. of the Department of Dendrology |
| 6. Ivan Narkevitch | Prof. of the Department of Dendrology |

Faculty of Agriculture - Skopje

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| Ordan Cukaliev, Ph.D. | Prof. of the Department of Melioration |
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Ministry of Agriculture Forestry and Water Economy - Skopje

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| 1. Mile Jakimovski | State Adviser |
| 2. Ljupco Nestorovski | Director of the State Inspection Services for Forestry and Hunting |
| 3. Jovica Ristovski | Head of the Unit for Hunting |
| 4. Zoran Zlatevski | Senior State Inspector for Forestry & Hunting |
| 5. Nadica Dzerkovska | Head of the Unit for European Integration |

Ministry of Environment - Skopje

- | | |
|-----------------------|--|
| 1. Metodija Dimovski | Assistant Minister |
| 2. Ljupco Avramovski | Director of the Fund for Environment and Nature Protection and Promotion |
| 3. Rakip Doci | Deputy Director of the Agency for Environment |
| 4. Vasil Anastasovski | Head of the Service of Environment |

The Union of National Parks & Reserves of Republic of Macedonia

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|----------------|------------------------|
| Boris Gelevski | Secretary of the Union |
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U.S. Agency for International Development

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|----------------------------|--|
| 1. Afrodita Salja | Local Government and Governance Specialist |
| 2. Diane S. Ponasik, Ph.D. | General Development Officer |
| 3. Robert W. Resseguie | Community Self Help Initiative |

World Bank Office

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|-----------------------------|---|
| 1. Rapeepun Jaisaard, Ph.D. | Senior Agricultural Economist - Washington, D.C. |
| 2. Aleksandar Nacev | Agriculture & Environment Operations Officer - Skopje |

Public Enterprise “Makedonski Sumi”

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|---------------------|---|
| 1. Igor Aleksov | Director of the Local office “Plackovica”- Vinica |
| 2. Todor Seizov | Director of the Local office “Kozuf”- Gevgelija |
| 3. Dragan Nadzinski | Director of the Local office “Malesevo”- Berovo |

NGO

- | | |
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| Pandora Nikuseva | President of the Ecologists’ Movement of Macedonia |
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National Park “Pelister”

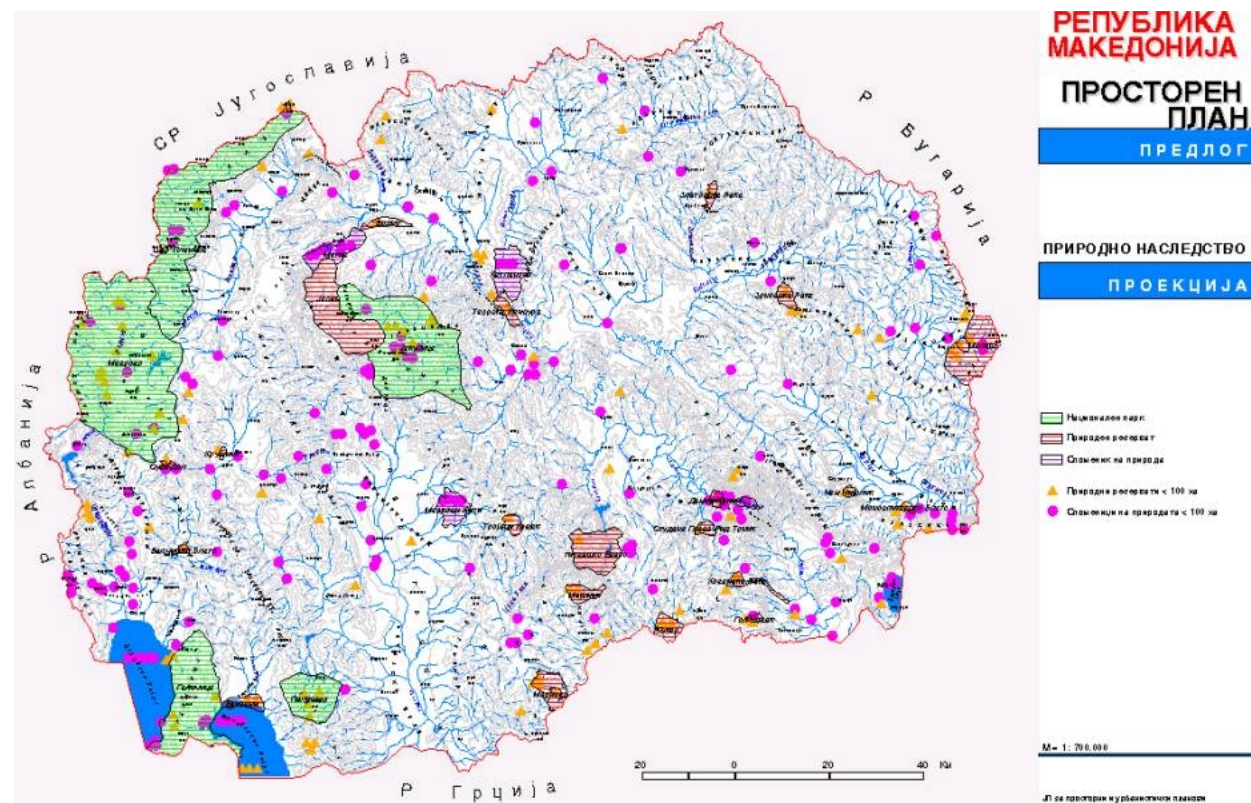
- | | |
|------------------|--|
| Petar Vasilevski | Director of the National Park “Pelister” |
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Resen Community

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| Dimko Toskovski, M.D. | Mayor of the Resen Community |
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ANNEX D

Map of Protected Areas of Macedonia



ANNEX E

List of Vertebrate Species of Macedonia with Their International Legal and Conservation Status

BERN: Convention on the Conservation of Natural Habitats and Wild Fauna and Flora.
Appendix I: Strictly protected plant species
Appendix II: Strictly protected animal species
Appendix III: Protected animal species
BONN: Convention of the Conservation of Migratory Species of Wild Animals.
Appendix I: Endangered Migratory Species
Appendix II: Migratory Species to be subject to agreements
IUCN: 1996, IUCN Red List of Threatened Animals
CR: Critically endangered; **EN:** Endangered; **VU:** Vulnerable; **LR-nt:** Lower Risk-near threatened; **LR-cd:** Lower Risk-conservation dependent; **DD:** Data deficient
Red Data Book of European Vertebrates: World Conservation Monitoring Centre (WCMC)-in press
List 1: Taxonomic list of globally threatened vertebrates restricted to Europe
List 2: Taxonomic list of globally threatened vertebrates not restricted to Europe
List 3: Species not globally threatened but of special concern in Europe

Fishes

No	Common name	Scientific name	IUCN	BERN
1.	Lamprey	Eudontomyzon mariae	III	
2.	Twaitte shad	Alosa fallax	III	
3.	Rainbow trout	Salmo gairdneri		
4.	Ohrid trout - belvica	Acantholingua ohridana		VU
5.	Ohrid trout	Salmo letnica		VU
6.	Macedonian trout	Salmo macedonicus		
7.	Radika trout	Salmo farioides		
8.	Pelagonian trout	Salmo pelagonicus		
9.	Pelister trout	Salmo peristericus		
10.	West Balkan trout	Salmo marmoratus		
11.	Brook	Salvelinus fontinalis		
12.	Pike	Esox lucius		
13.	Ohrid-Prespa chub	Leuciscus cephalus albus		
14.	Strumica chub	Leuciscus cephalus macedonicus		
15.	Vardar chub	Leuciscus cephalus vardarensis		
16.	Macedonian roach	Rutilus macedonicus	III	
17.	Dojran roach	Rutilus rutilus dojranensis		
18.	Ohrid roach	Rutilus rubilio ochridanus	III	
19.	Prespa roach	Rutilus rubilio prespensis	III	
20.		Pachychilon pictum	III	
21.	Common minnow	Phoxinus phoxinus		
22.		Phoxinellus epiroticus prespensis	III	

No	Common name	Scientific name	IUCN	BERN
23.		Phoxinellus minutus	III	
24.	Dojran rudd	Scardinius erythrophthalmus dojranensis		
25.	Ohrid rudd	Scardinius erythrophthalmus scardafa		
26.	Macedonian bleak	Alburnus alburnus macedonicus		
27.	Strumica bleak	Alburnus alburnus strumicae		
28.	Prespa bleak	Alburnus albidus belvica	III	VU
29.	Ohrid bleak	Alburnus alburnus alborella		
30.	Rifle minnow	Alburnoides bipunctatus bipunctatus	III	
31.	Ohrid rifle minnow	Alburnoides bipunctatus ohridanus	III	
32.	Prespa rifle minnow	Alburnoides bipunctatus prespensis	III	
33.	Balkan vimba	Vimba melanops		VU
34.	Tench	Tinca tinca		
35.	Vardar undermouth	Chondrostoma nasus vardarensis	III	
36.	Ohrid undermouth	Chondrostoma nasus ohridanus	III	
37.	Prespa undermouth	Chondrostoma nasus prespensis	III	
38.	Prespa barbel	Barbus prespensis	III	VU
39.	Vardar barbel	Barbus barbus macedonicus		
40.	Strumica barbel	Barbus cyclolepis strumicae		
41.	West Balkan barbel	Barbus meridionalis rebelli	III	
42.	Ohrid gudgeon	Gobio gobio ohridanus		
43.	Vardar gudgeon	Gobio gobio balcanicus		
44.	Long-whiskered gudgeon	Gobio uranoscopus	III	
45.	Pacific gudgeon	Gobio kessleri	III	
46.	Amur bitterling	Rhodeus sericeus		
47.	Carp	Cyprinus carpio		
48.	Golden carp	Carassius carassius		
49.	Goldfish	Carassius auratus gibelio		
50.	Ohrid loach	Noemacheilus barbatulus sturanyi		
51.	Vardar loach	Noemacheilus barbatulus vardarensis		
52.	Strumica loach	Noemacheilus angorae bureschi		
53.	Prespa spined loach	Cobitis taenia meridionalis	III	
54.	Ohrid spined loach	Cobitis taenia ohridana	III	
55.	Vardar spined loach	Cobitis taenia vardarensis	III	
56.	Strumica spined loach	Cobitis taenia strumicae	III	
57.	Balkan spined loach	Cobitis aurata balcanica	III	
58.	Wels; Sheat fish; Catfish	Silurus glanis		
59.	Eel	Anguilla anguilla		
60.	Mosquito fish	Gambusia affinis		
61.	Macedonian perch	Perca fluviatilis macedonicus		
62.	Pike perch	Stizostedion lucioperca		
63.	Vardar little chop	Zingel streber balcanicus	III	VU
64.	River blenny	Blennius fluviatilis	III	
65.	Miller's thumb	Cottus gobio		

Amphibians

No	Common name	Scientific name	IUCN	BERN
1.	Fire salamander	<i>Salamandra salamandra</i>		III
2.	Alpine newt	<i>Triturus alpestris</i>		III
3.	Crested newt	<i>Triturus cristatus</i>		II
4.	Smooth newt	<i>Triturus vulgaris</i>		III
5.	Yellow-bellied toad	<i>Bombina variegata</i>		II
6.	Green toad	<i>Bufo viridis</i>		II
7.	Common toad	<i>Bufo bufo</i>		III
8.	European tree frog	<i>Hyla arborea</i>	LR	II
9.	Syrian spadefoot	<i>Pelobates syriacus</i>		II
10.	Agile frog	<i>Rana dalmatina</i>		II
11.	Stream frog	<i>Rana graeca</i>		III
12.	Balkan frog	<i>Rana balcanica</i>		III
13.	Edible frog	<i>Rana kl. esculenta</i>		III
14.	Lake frog	<i>Rana ridibunda</i>		III
15.	Grass frog	<i>Rana temporaria</i>		III

Reptiles

No	Common name	Scientific name	IUCN	BERN
1.	European pond terrapin	<i>Emys orbicularis</i>	LR	II
2.	Caspian terrapin	<i>Mauremys caspica</i>		II
3.	Mediterranean spur-thighed tortoise	<i>Testudo graeca</i>	VU	II
4.	Hermann's tortoise	<i>Testudo hermanni</i>	LR	II
5.	Slow worm	<i>Anguis fragilis</i>		III
6.	European glass lizard	<i>Pseudopus apodus</i>		II
7.	Kotschy's gecko	<i>Cyrodactylus kotschy</i>		II
8.	Dalmatian algyroides	<i>Algyroides nigropunctatus</i>		II
9.	Sand lizard	<i>Lacerta agilis</i>		II
10.	Three lined lizard	<i>Lacerta trilineata</i>		II
11.	Green lizard	<i>Lacerta viridis</i>		II
12.	Viviparous lizard	<i>Lacerta vivipara</i>	VU	III
13.	Erhard's wall lizard	<i>Podarcis erhardii</i>		II
14.	Common wall lizard	<i>Podarcis muralis</i>		II
15.	Balkan wall lizard	<i>Podarcis taurica</i>		II
16.	Snake-eyed skink	<i>Ablepharus kitaibelii</i>		II
17.	Javelin sand boa	<i>Eryx jaculus</i>		III
18.	European whip snake	<i>Coluber caspius</i>		III
19.	Balkan whip snake	<i>Coluber gemonensis</i>		II
20.	Dahl's whip snake	<i>Coluber najadum</i>		II
21.	Smooth snake	<i>Coronella austriaca</i>		II
22.	Aesculapian snake	<i>Elaphe longissima</i>		II
23.	Four-lined snake	<i>Elaphe quatuorlineata</i>		II
24.	Leopard snake	<i>Elaphe situla</i>	DD	II
25.	Montpellier snake	<i>Malpolon monspessulanus</i>		III

No	Common name	Scientific name	IUCN	BERN
26.	Grass snake	Natrix natrix		III
27.	Dice snake	Natrix tessallata		II
28.	Cat snake	Telescopus fallax		II
29.	European blind snake	Typhlops vermicularis		III
30.	Nose-horned viper	Vipera ammodytes		II
31.	Adder	Vipera berus		III
32.	Meadow viper	Vipera ursinii	EN	II

Birds

No	Species	Latin name	IUCN	Bern	Bonn
1	Red-throated Loon	Gavia stellata	VU	II	II
2	Black-throated Loon	Gavia arctica	VU	II	II
3	Little Grebe	Tachybaptus ruficollis	LR	II	
4	Black-necked Grebe	Podiceps nigricollis	LR	II	
5	Horned (Slavonian) Grebe	Podiceps auritus	DD	II	
6	Red-necked Grebe	Podiceps griseigena	DD	II	
7	Great Crested Grebe	Podiceps cristatus	VU	III	
8	White Pelican	Pelecanus onocrotalus	EXT	II	I/II
9	Dalmatian Pelican	Pelecanus crispus	CR	II	I/II
10	Great Cormorant	Phalacrocorax carbo	LR	III	
11	Pygmy Cormorant	Phalacrocorax pygmaeus	LR	II	II
12	Bittern	Botaurus stellaris	VU	II	II
13	Little Bittern	Ixobrychus minutus	VU	II	II
14	Night Heron	Nycticorax nycticorax	LR	II	
15	Squacco Heron	Ardeola ralloides	VU	II	
16	Cattle Egret	Bubulcus ibis	DD	II	
17	Great Egret	Egretta alba	LR	II	
18	Little Egret	Egretta garzetta	LR	II	
19	Grey Heron	Ardea cinerea	LR	III	
20	Purple Heron	Ardea purpurea	VU	II	II
21	Spoonbill	Platalea leucorodia	CR	II	II
22	Glossy Ibis	Plegadis falcinellus	CR	II	II
23	White Stork	Ciconia ciconia	LR	II	II
24	Black Stork	Ciconia nigra	VU	II	II
25	Flamingo	Phoenicopterus ruber	DD	II	II
26	Greylag goose	Anser anser	LR	III	II
27	White-fronted Goose	Anser albifrons	LR	III	II
28	Lesser White-fronted Goose	Anser erythropus	DD	II	II
29	Bean Goose	Anser fabalis	LR	III	II
30	Mute Swan	Cygnus olor	DD	III	II
31	Whooper Swan	Cygnus cygnus	DD	II	II
32	Shelduck	Tadorna tadorna	DD	II	II
33	Mallard	Anas platyrhynchos	LR	III	II
34	Teal	Anas crecca	LR	III	II
35	Gadwall	Anas strepera	LR	III	II

No	Species	Latin name	IUCN	Bern	Bonn
36	Wigeon	Anas penelope	LR	III	II
37	Pintail	Anas acuta	LR	III	II
38	Garganey	Anas querquedula	VU	III	II
39	Shoveler	Anas clypeata	LR	III	II
40	Marbled Duck	Marmaronetta angustirostris	NE	II	II
41	Red-crested Pochard	Netta rufina	LR	III	II
42	Pochard	Aythya ferina	LR	III	II
43	Ferruginous Duck	Aythya nyroca	VU	III	II
44	Tufted Duck	Aythya fuligula	LR	III	II
45	Scaup	Aythya marila	DD	III	II
46	Velvet Scoter	Melanitta fusca	DD	III	II
47	Long-tailed Duck	Clangula hyemalis	DD	III	II
48	Goldeneye	Bucephala clangula	LR	III	II
49	Smew	Mergus albellus	VU	II	II
50	Red-breasted Merganser	Mergus serrator	DD	III	II
51	Goosander	Mergus merganser	LR	III	II
52	White-headed Duck	Oxyura leucocephala	EXT	II	I/II
53	Osprey	Pandion haliaetus	VU	II	II
54	Honey Buzzard	Pernis apivorus	LR	II	II
55	Red Kite	Milvus milvus	CR	II	II
56	Black Kite	Milvus migrans	VU	II	II
57	White-tailed Eagle	Haliaeetus albicilla	VU	II	I
58	Goshawk	Accipiter gentilis	LR	II	II
59	Levant Sparrowhawk	Accipiter brevipes	VU	II	II
60	Sparrowhawk	Accipiter nisus	LR	II	II
61	Rough-legged Buzzard	Buteo lagopus	LR	II	II
62	Long-legged Buzzard	Buteo rufinus	LR	II	II
63	Buzzard	Buteo buteo	LR	II	II
64	Booted Eagle	Hieraaetus pennatus	EN	II	II
65	Bonelli's Eagle	Hieraaetus fasciatus	CR	II	II
66	Spotted Eagle	Aquila clanga	EN	II	II
67	Lesser Spotted Eagle	Aquila pomarina	EN	II	II
68	Imperial Eagle	Aquila heliaca	EN	II	II
69	Golden Eagle	Aquila chrysaetos	LR	II	II
70	Egyptian Vulture	Neophron percnopterus	VU	II	II
71	Lammergeier	Gypaetus barbatus	CR	II	II
72	Black Vulture	Aegypius monachus	CR	II	II
73	Griffon Vulture	Gyps fulvus	VU	II	II
74	Short-toed Eagle	Circaetus gallicus	VU	II	II
75	Hen Harrier	Circus cyaneus	VU	II	II
76	Pallid Harrier	Circus macrourus	NE	II	II
77	Montagu's Harrier	Circus pygargus	VU	II	II
78	Marsh Harrier	Circus aeruginosus	VU	II	II
79	Saker Falcon	Falco cherrug	LR	II	II
80	Lanner Falcon	Falco biarmicus	EN	II	II
81	Peregrine	Falco peregrinus	VU	II	II

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82	Hobby	Falco subbuteo	LR	II	II
83	Merlin	Falco columbarius	LR	II	II
84	Red-footed Falcon	Falco vespertinus	VU	II	II
85	Lesser Kestrel	Falco naumanni	CR	II	II
86	Kestrel	Falco tinnunculus	LR	II	II
87	Hazel Grouse	Bonasa bonasia (Tetrastes bonasia)	LR	III	
88	Capercaillie	Tetrao urogallus	EN	II	
89	Rock Partridge	Alectoris graeca	VU	III	
90	Grey Partridge	Perdix perdix	LR	III	
91	Quail	Coturnix coturnix	LR	III	II
92	Pheasant	Phasianus colchicus	NE	III	
93	Crane	Grus grus	EXT	II	II
94	Great Bustard	Otis tarda	EXT	II	I/II
95	Little Bustard	Tetrax tetrax	CR	II	
96	Water Rail	Rallus aquaticus	VU	III	
97	Spotted Crake	Porzana porzana	DD	II	II
98	Little Crake	Porzana parva	DD	II	II
99	Bailon's Crake	Porzana pusilla	DD	II	II
100	Corncrake	Crex crex	VU	II	
101	Moorhen	Gallinula chloropus	LR	III	
102	Coot	Fulica atra	LR	III	
103	Ringed Plover	Charadrius hiaticula	LR	II	II
104	Little Ringed Plover	Charadrius dubius	LR	II	II
105	Dotterel	Charadrius morinellus (Eudromias morinellus)	DD	II	II
106	Golden Plover	Pluvialis apricaria	LR	III	II
107	Grey Plover	Pluvialis squatarola	LR	III	II
108	Lapwing	Vanellus vanellus	LR	III	II
109	Turnstone	Arenaria interpres	DD	II	
110	Little Stint	Calidris minuta	LR	II	
111	Temminck's Stint	Calidris temminckii	LR	II	
112	Dunlin	Calidris alpina	VU	II	
113	Sanderling	Calidris alba	LR		
114	Curlew Sandpiper	Calidris ferruginea	LR	II	
115	Ruff	Philomachus pugnax	LR	III	II
116	Broad-billed Sandpiper	Limicola falcinellus	VU		
117	Spotted Redshank	Tringa erythropus	LR	III	II
118	Redshank	Tringa totanus	VU	III	II
119	Marsh Sandpiper	Tringa stagnatilis	LR	II	II
120	Greenshank	Tringa nebularia	LR	III	II
121	Green Sandpiper	Tringa ochropus	LR	II	II
122	Wood Sandpiper	Tringa glareola	LR	II	II
123	Common Sandpiper	Actitis hypoleucos (Tringa hypoleuca)	LR	II	II
124	Black-tailed Godwit	Limosa limosa	VU	II	III
125	Curlew	Numenius arquata	VU	III	II
126	Slender-billed Curlew	Numenius tenuirostris	CR	II	I/II
127	Whimbrel	Numenius phaeopus	DD	III	II

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128	Woodcock	<i>Scolopax rusticola</i>	VU	III	
129	Snipe	<i>Gallinago gallinago</i>	LR	III	
130	Great Snipe	<i>Gallinago media</i>	VU	II	II
131	Jack Snipe	<i>Lymnocyptes minimus</i>	VU	III	
132	Black-winged Stilt	<i>Himantopus himantopus</i>	VU	II	II
133	Avocet	<i>Recurvirostra avosetta</i>	VU	II	II
134	Stone-curlew	<i>Burhinus oedicephalus</i>	EN	II	II
135	Collared Pratincole	<i>Glareola pratincola</i>	EN	II	II
136	Black-Winged Pratincole	<i>Glareola nordmanni</i>	DD	II	II
137	Mediterranean Gull	<i>Larus melanocephalus</i>	LR	II	II
138	Little Gull	<i>Larus minutus</i>	LR	II	
139	Black-headed Gull	<i>Larus ridibundus</i>	LR	III	
140	Slender-billed Gull	<i>Larus genei</i>	NE	II	
141	Yellow-legged Gull	<i>Larus cachinnans</i>	LR	III	
142	Common Gull	<i>Larus canus</i>	LR	III	
143	Kittiwake	<i>Rissa tridactyla</i>	DD	III	
144	Black Tern	<i>Chlidonias niger</i>	VU	II	II
145	White-winged Tern	<i>Chlidonias leucopterus</i>	LR	II	
146	Whiskered Tern	<i>Chlidonias hybrida</i>	VU	II	
147	Gull-billed Tern	<i>Gelochelidon nilotica</i>	VU	II	
148	Caspian Tern	<i>Sterna caspia</i>	VU	II	II
149	Sandwich Tern	<i>Sterna sandvicensis</i>	VU	II	II
150	Common Tern	<i>Sterna hirundo</i>	LR	II	
151	Little Tern	<i>Sterna albifrons</i>	VU	II	II
152	Wood Pigeon	<i>Columba palumbus</i>	LR	III	
153	Stock Dove	<i>Columba oenas</i>	LR	III	
154	Rock Dove	<i>Columba livia</i>	EN	III	
155	Collared Dove	<i>Streptopelia decaocto</i>	LR	III	
156	Turtle Dove	<i>Streptopelia turtur</i>	VU	III	
157	Cuckoo	<i>Cuculus canorus</i>	LR	III	
158	Great Spotted Cuckoo	<i>Clamator glandarius</i>	DD	II	
159	Eagle Owl	<i>Bubo bubo</i>	VU	II	
160	Long-eared Owl	<i>Asio otus</i>	LR	II	
161	Short-eared Owl	<i>Asio flammeus</i>	VU	II	
162	Scops Owl	<i>Otus scops</i>	LR	II	
163	Tengmalm's Owl	<i>Aegolius funereus</i>	LR	II	
164	Little Owl	<i>Athene noctua</i>	LR	II	
165	Tawny Owl	<i>Strix aluco</i>	LR	II	
166	Ural Owl	<i>Strix uralensis</i>	LR	II	
167	Barn Owl	<i>Tyto alba</i>	VU	II	
168	Nightjar	<i>Caprimulgus europaeus</i>	VU	II	
169	Swift	<i>Apus apus</i>	LR	III	
170	Alpine Swift	<i>Apus melba</i>	LR	II	
171	Roller	<i>Coracias garrulus</i>	LR	II	II
172	Kingfisher	<i>Alcedo atthis</i>	LR	II	
173	Bee-eater	<i>Merops apiaster</i>	LR	II	II

No	Species	Latin name	IUCN	Bern	Bonn
174	Hoopoe	Upupa epops	LR	II	
175	Wryneck	Jynx torquilla	VU	II	
176	Green Woodpecker	Picus viridis	VU	II	
177	Grey-headed Woodpecker	Picus canus	VU	II	
178	Black Woodpecker	Dryocopus martius	VU	II	
179	Great Spotted Woodpecker	Dendrocopos major	LR	II	
180	Syrian Woodpecker	Dendrocopos syriacus	LR	II	
181	Middle Spotted Woodpecker	Dendrocopos medius	LR	II	
182	White-backed Woodpecker	Dendrocopos leucutos	VU	II	
183	Lesser Spotted Woodpecker	Dendrocopos minor	LR	II	
189	Short-toed Lark	Calandrella brachydactyla	VU	II	
190	Calandra Lark	Melanocorypha calandra	EN	II	
191	Horned Lark	Eremophila alpestris	VU	II	
192	Crested Lark	Galerida cristata	VU	III	
193	Woodlark	Lullula arborea	VU	III	
194	Skylark	Alauda arvensis	VU	III	
184	Sand Martin	Riparia riparia	VU	II	
185	Crag Martin	Ptyonoprogne rupestris (Hirundo rupestris)	LR	II	
186	Barn Swallow	Hirundo rustica	VU	II	
187	Red-rumped Swallow	Hirundo daurica	LR	II	
188	House Martin	Delichon urbica	LR	II	
195	Tawny Pipit	Anthus campestris	VU	II	
196	Tree Pipit	Anthus trivialis	LR	II	
197	Meadow Pipit	Anthus pratensis	LR	II	
198	Red-throated Pipit	Anthus cervinus	DD	II	
199	Water Pipit	Anthus spinoletta	LR	II	
200	Yellow Wagtail	Motacilla flava	LR	II	
201	Grey Wagtail	Motacilla cinerea	LR	II	
202	Pied Wagtail	Motacilla alba	LR	II	
203	Red-backed Shrike	Lanius collurio	VU	II	
204	Masked Shrike	Lanius nubicus	DD	II	
205	Woodchat Shrike	Lanius senator	VU	II	
206	Lesser Grey Shrike	Lanius minor	VU	II	
207	Grey Shrike	Lanius excubitor	LR	II	
208	Oriole	Oriolus oriolus	LR	II	
209	Starling	Sturnus vulgaris	LR	III	
210	Rose-coloured Starling	Sturnus roseus	DD	II	
211	Jay	Garrulus glandarius	LR	III	
212	Magpie	Pica pica	LR	III	
213	Nutcracker	Nucifraga caryocatactes	VU	II	
214	Cough	Pyrrhocorax pyrrhocorax	EN	II	
215	Alpine Cough	Pyrrhocorax graculus	LR	II	
216	Jackdaw	Corvus monedula	LR	X	
217	Rook	Corvus frugilegus	LR	III	
218	Hooded Crow	Corvus cornix	LR	III	
219	Raven	Corvus corax	LR	III	

No	Species	Latin name	IUCN	Bern	Bonn
220	Waxwing	Bombycilla garrulus	LR	II	
221	Dipper	Cinclus cinclus	LR	II	
222	Wren	Troglodytes troglodytes	LR	III	
223	Dunnock	Prunella collaris	LR	II	
224	Alpine Accentor	Prunella modularis	LR	II	
225	Cetti's Warbler	Cettia cetti	LR	II	II
226	Savi's Warbler	Locustella luscinioides	LR	II	II
227	Grasshopper Warbler	Locustella naevia	DD	II	II
228	Moustached Warbler	Acrocephalus melanopogon (Lusciniola melanopogon)	LR	II	II
229	Aquatic Warbler	Acrocephalus paludicola	VU	II	II
230	Sedge Warbler	Acrocephalus schoenobaenus	LR	II	II
231	Marsh Warbler	Acrocephalus palustris	LR	II	II
232	Reed Warbler	Acrocephalus scirpaceus	LR	II	II
233	Great Reed Warbler	Acrocephalus arundinaceus	LR	II	II
234	Icterine Warbler	Hippolais icterina	LR	II	II
235	Olivaceous Warbler	Hippolais pallida	EN	II	II
236	Barred Warbler	Sylvia nisoria	VU	II	II
237	Orphean Warbler	Sylvia hortensis	VU	II	II
238	Garden Warbler	Sylvia borin	LR	II	II
239	Blackcap	Sylvia atricapilla	LR	II	II
240	Whitethroat	Sylvia communis	VU	II	II
241	Lesser Whitethroat	Sylvia curruca	LR	II	II
242	Sardinian Warbler	Sylvia melanocephala	LR	II	II
243	Subalpine Warbler	Sylvia cantillans	LR	II	II
244	Willow Warbler	Phylloscopus trochilus	LR	II	II
245	Chiffchaff	Phylloscopus collybita	LR	II	II
246	Bonelli's Warbler	Phylloscopus bonelli	VU	II	II
247	Wood Warbler	Phylloscopus sibilatrix	LR	II	II
248	Goldcrest	Regulus regulus	LR	II	II
249	Firecrest	Regulus ignicapillus	LR	II	II
250	Pied Flycatcher	Ficedula hypoleuca	LR	II	II
251	Collared Flycatcher	Ficedula albicollis	VU	II	II
252	Red-breasted Flycatcher	Ficedula parva	VU	II	II
253	Spotted Flycatcher	Muscicapa striata	LR	II	II
254	Whinchat	Saxicola rubetra	LR	II	II
255	Stonechat	Saxicola torquata	VU	II	II
256	Wheatear	Oenanthe oenanthe	LR	II	II
257	Black-eared Wheatear	Oenanthe hispanica	VU	II	II
258	Rufous Bush-chat	Cercotrichas galactotes	DD	II	II
259	Rock Thrush	Monticola saxatilis	LR	II	II
260	Blue Rock Thrush	Monticola solitarius	VU	II	II
261	Black Redstart	Phoenicurus ochruros	LR	II	II
262	Redstart	Phoenicurus phoenicurus	EN	II	II
263	Robin	Erithacus rubecula	LR	II	II
264	Nightingale	Luscinia megarhynchos	LR	II	II

No	Species	Latin name	IUCN	Bern	Bonn
265	Fieldfare	<i>Turdus pilaris</i>	LR	III	II
266	Ring Ouzel	<i>Turdus torquatus</i>	LR	II	II
267	Blackbird	<i>Turdus merula</i>	LR	III	II
268	Redwing	<i>Turdus iliacus</i>	LR	III	II
269	Song Thrush	<i>Turdus philomelos</i>	LR	III	II
270	Mistle Thrush	<i>Turdus viscivorus</i>	LR	III	II
271	Bearded Tit	<i>Panurus biarmicus</i>	LR	II	
272	Long-tailed Tit	<i>Aegithalos caudatus</i>	LR	II	
273	Marsh Tit	<i>Parus palustris</i>	LR	II	
274	Willow Tit	<i>Parus montanus</i>	LR	II	
275	Sombre Tit	<i>Parus lugubris</i>	LR	II	
276	Crested Tit	<i>Parus cristatus</i>	VU	II	
277	Coal Tit	<i>Parus ater</i>	LR	II	
278	Blue Tit	<i>Parus caeruleus</i>	LR	II	
279	Great Tit	<i>Parus major</i>	LR	II	
280	Nuthatch	<i>Sitta europea</i>	VU	II	
281	Rock Nuthatch	<i>Sitta neumayer</i>	LR	II	
282	Wallcreeper	<i>Tichodroma muraria</i>	LR	II	
283	Treecreeper	<i>Certhia familiaris</i>	LR	II	
284	Short-toed Treecreeper	<i>Certhia brachydactyla</i>	LR	II	
285	Penduline Tit	<i>Remiz pendulinus</i>	LR	III	
286	House Sparrow	<i>Passer domesticus</i>	LR	III	
287	Spanish Sparrow	<i>Passer hispaniolensis</i>	VU	III	
288	Tree Sparrow	<i>Passer montanus</i>	LR	III	
289	Rock Sparrow	<i>Petronia petronia</i>	EN	II	
290	Snowfinch	<i>Montifringilla nivalis</i>	EN	II	
291	Chaffinch	<i>Fringilla coelebs</i>	LR	III	
292	Brambling	<i>Fringilla montifringilla</i>	LR	III	
293	Serin	<i>Serinus serinus</i>	LR	II	
294	Greenfinch	<i>Carduelis chloris</i>	LR	II	
295	Siskin	<i>Carduelis spinus</i>	VU	II	
296	Goldfinch	<i>Carduelis carduelis</i>	LR	II	
297	Linnet	<i>Carduelis cannabina</i> (<i>Acanthis cannabina</i>)	LR	II	
298	Common Crossbill	<i>Loxia curvirostra</i>	LR	II	
299	Bullfinch	<i>Pyrrhula pyrrhula</i>	LR	III	
300	Hawfinch	<i>Coccothraustes coccothraustes</i>	LR	II	
301	Corn Bunting	<i>Miliaria calandra</i> (<i>Emberiza calandra</i>)	LR	III	
302	Yellowhammer	<i>Emberiza citrinella</i>	LR	II	
303	Rock Bunting	<i>Emberiza cia</i>	VU	II	
304	Ortolan	<i>Emberiza hortulana</i>	VU	III	
305	Cirl Bunting	<i>Emberiza cirlus</i>	LR	II	
306	Black-headed Bunting	<i>Emberiza melanocephala</i>	VU	II	
307	Reed Bunting	<i>Emberiza schoeniclus</i>	VU	II	

Mammals

No	Common name	Scientific name	IUCN	BERN
1.	Eastern hedgehog	<i>Erinaceus concolor</i>		
2.	Pygmy shrew	<i>Sorex minutus</i>		III
3.	Common shrew	<i>Sorex araneus</i>		III
4.	Water shrew	<i>Neomys fodiens</i>		III
5.	Miller's water shrew	<i>Neomys anomalus</i>		III
6.	Pygmy white-toothed shrew	<i>Suncus etruscus</i>		III
7.	Lesser white-toothed shrew	<i>Crocidura suaveolens</i>		III
8.	Bi-coloured white-toothed shrew	<i>Crocidura leucodon</i>		III
9.	Common mole	<i>Talpa europaea</i>		
10.	Blind mole	<i>Talpa caeca</i>		
11.	Balkan mole	<i>Talpa stankovici</i>		
12.	Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	LR	II
13.	Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	VU	II
14.	Mediterranean horseshoe bat	<i>Rhinolophus euryale</i>	VU	II
15.	Mehely's horseshoe bat	<i>Rhinolophus mehelyi</i>	VU	II
16.	Blasius' horseshoe bat	<i>Rhinolophus blasii</i>	LR	II
17.	Whiskered bat	<i>Myotis mystacinus</i>		II
18.	Geoffroy's bat	<i>Myotis emarginatus</i>	VU	II
19.	Natterer's bat	<i>Myotis nattereri</i>		II
20.	Greater mouse-eared bat	<i>Myotis myotis</i>	LR	II
21.	Lesser mouse-eared bat	<i>Myotis blythii</i>		II
22.	Daubenton's bat	<i>Myotis daubentonii</i>		II
23.	Long-fingered bat	<i>Myotis capaccinii</i>	VU	II
24.	Parti-coloured bat	<i>Vespertilio murinus</i>		II
25.	Serotine	<i>Eptesicus serotinus</i>		II
26.	Leisler's bat	<i>Nyctalus leisleri</i>	LR	II
27.	Noctule	<i>Nyctalus noctula</i>		II
28.	Common pipistrelle	<i>Pipistrellus pipistrellus</i>		III
29.	Nathusius pipistrelle	<i>Pipistrellus nathusii</i>		II
30.	Kuhl's pipistrelle	<i>Pipistrellus kuhli</i>		II
31.	Savi's pipistrelle	<i>Pipistrellus savii</i>		II
32.	Barbastelle	<i>Barbastella barbastellus</i>	VU	II
33.	Grey long-eared bat	<i>Plecotus austriacus</i>		II
34.	Schreiber's bat	<i>Miniopterus schreibersii</i>	LR	II
35.	European free-tailed bat	<i>Tadarida teniotis</i>		II
36.	Brown hare	<i>Lepus europaeus</i>		III
37.	Rabbit	<i>Oryctolagus cuniculus</i>		
38.	Red squirell	<i>Sciurus vulgaris</i>	LR	III
39.	European souslik	<i>Spermophilus citellus</i>	VU	II
40.	Bank vole	<i>Clethrionomys glareolus</i>		
41.	Muskrat	<i>Ondatra zibethicus</i>		
42.	Balkan snow vole	<i>Dinaromys bogdanovi</i>	LR	
43.	Water vole	<i>Arvicola terrestris</i>		
44.	Common vole	<i>Microtus arvalis</i>		

No	Common name	Scientific name	IUCN	BERN
45.	Sibling vole	<i>Microtus rossiaemeridionalis</i>		
46.	Guenther's vole	<i>Microtus guentheri</i>	LR	
47.	Common pine vole	<i>Microtus subterraneus</i>		
48.	Balkan pine vole	<i>Microtus felteni</i>	LR	
49.	Snow vole	<i>Chionomys nivalis</i>	LR	III
50.	Striped field mouse	<i>Apodemus agrarius</i>		
51.	Rock mouse	<i>Apodemus mystacinus</i>		
52.	Yellow-necked mouse	<i>Apodemus flavicollis</i>		
53.	Wood mouse	<i>Apodemus sylvaticus</i>		
54.	Harvest mouse	<i>Micromys minutus</i>	LR	
55.	Black rat	<i>Rattus rattus</i>		
56.	Brown rat	<i>Rattus norvegicus</i>		
57.	Western house mouse	<i>Mus domesticus</i>		
58.	Balkan short-tailed mouse	<i>Mus macedonicus</i>		
59.	Lesser mole rat	<i>Nannospalax leucodon</i>	VU	
60.	Fat dormouse	<i>Glis glis</i>	LR	III
61.	Common dormouse	<i>Muscardinus avellanarius</i>	LR	III
62.	Forest dormouse	<i>Dryomys nitedula</i>	LR	III
63.	Coypu	<i>Myocastor coypus</i>		
64.	Golden jackal	<i>Canis aureus</i>		
65.	Wolf	<i>Canis lupus</i>	LR	II
66.	Red fox	<i>Vulpes vulpes</i>		
67.	Brown bear	<i>Ursus arctos</i>		II
68.	Weasel	<i>Mustela nivalis</i>		III
69.	Western polecat	<i>Mustela putorius</i>		III
70.	Marbled polecat	<i>Vormela peregusna</i>	VU	II
71.	Pine marten	<i>Martes martes</i>		III
72.	Beech marten	<i>Martes foina</i>		III
73.	Badger	<i>Meles meles</i>		III
74.	Otter	<i>Lutra lutra</i>		II
75.	Wildcat	<i>Felis silvestris</i>	VU	II
76.	Lynx	<i>Lynx lynx</i>		III
77.	Wild boar	<i>Sus scrofa</i>		III
78.	Red deer	<i>Cervus elaphus</i>		II
79.	Fallow deer	<i>Dama dama</i>		III
80.	Roe deer	<i>Capreolus capreolus</i>		III
81.	Mouflon	<i>Ovis orientalis</i>		
82.	Alpine chamois	<i>Rupicapra rupicapra</i>		III

ANNEX F

Taxonomic Lists of Threatened Species of Vertebrates and Species of Special European Concern Present in Macedonia (According to Red Data Book of European Vertebrates)

List 1. Taxonomic List of Globally Threatened Endemics, Present in Macedonia

No	Common name	Scientific name	IUCN
	Mammals		
1.	European souslik	<i>Spermophilus citellus</i>	VU A1c
2.	Lesser Mole Rat	<i>Nannospalax leucodon</i>	VU D2
	Birds		
3.	Aquatic warbler	<i>Acrocephalus paludicola</i>	VU A2b
	Reptilia		
4.	Orsini's Viper	<i>Vipera ursinii</i>	EN A1c + 2c
	Fishes		
5.	Prespa barbel	<i>Barbus prespensis</i>	VU A2c
6.	Balkan vimba	<i>Vimba melanops</i>	VU A1ce
7.	Ohrid Belvica - trout	<i>Acantholingua ohridana</i>	VU B1 + 2bc
8.	Ohrid trout	<i>Salmo letnica</i>	VU A1ad +2d
9.	Chop, streber	<i>Zingel streber</i>	VU A1c + 2ce
10.	Bleak	<i>Alburnus albidus</i>	VU A1ace

List 2. Taxonomic List of Globally Threatened Vertebrates Not Restricted to Europe, Present in Macedonia

No	Common name	Scientific name	IUCN
	Mammals		
1.	Mediterranean horseshoe bat	<i>Rhinolophus euryale</i>	VU A2c
2.	Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	VU A2c
3.	Mehely's horseshoe bat	<i>Rhinolophus mehelyi</i>	VU A2c
4.	Barbastelle	<i>Barbastella barbastellus</i>	VU A2c
5.	Long-fingered bat	<i>Myotis capaccinii</i>	VU A2c
6.	Geoffroy's bat	<i>Myotis emarginatus</i>	VU A2c
7.	Mouflon	<i>Ovis orientalis</i>	VU A2cde
	Birds		
8.	Dalmatian Pelican	<i>Pelecanus crispus</i>	VU C2a
9.	Ferruginous Duck	<i>Aythya nyroca</i>	VU A1acd
10.	Marbled Teal	<i>Marmaronetta angustirostris</i>	VU A2c
11.	Greater Spotted Eagle	<i>Aquila clanga</i>	VU C2a
12.	Imperial Eagle	<i>Aquila heliaca</i>	VU C2a
13.	Lesser Kestrel	<i>Falco naumanni</i>	VU A1ace
14.	Corncrake	<i>Crex crex</i>	VU A1ac

No	Common name	Scientific name	IUCN
15.	Great Bustard	Otis tarda	VU A2c
16.	Slender-billed curlew	Numenius tenuirostris	CR C2b
	Reptiles		
17.	Spur-thighed tortoise	Testudo graeca	VU A1cd

List 3. Taxonomic List of Species Not Globally Threatened But of Special European Concern, Present in Macedonia

No	Common name	Scientific name	IUCN
	Mammals		
1.	Blasius' Horseshoe Bat	Rhinolophus blasii	
2.	Greater Horseshoe Bat	Rhinolophus ferrumequinum	
3.	Schreiber's Bat	Miniopterus schreibersi	
4.	Kuhl's Pipistrelle	Pipistrellus kuhli	
5.	Golden Jackal	Canis aureus	
6.	Wolf	Canis lupus	
7.	Eurasian Lynx	Lynx lynx	
8.	Wild Cat	Felis silvestris	
9.	European Otter	Lutra lutra	
10.	Marbled Polecat	Vormela peregusna	
11.	Brown Bear	Ursus arctos	
12.	Edible Dormouse	Myoxus glis	
	Birds		
13.	Pygmy Cormorant	Phalacrocorax pygmeus	VU
14.	White Stork	Ciconia ciconia	VU
15.	Spoonbill	Platalea leucorodia	EN
16.	Levant Sparrowhawk	Accipiter brevipes	VU
17.	Rock Partridge	Alectoris graeca	VU
18.	Little Bustard	Tetrax tetrax	VU
19.	Great Snipe	Gallinago media	VU
20.	Black-tailed Godwit	Limosa limosa	VU
21.	Redshank	Tringa totanus	VU
22.	Scops Owl	Otus scops	LR
23.	Nightjar	Caprimulgus europaeus	VU
24.	Roller	Coracias garrulus	LR
25.	Green woodpecker	Picus viridis	VU
26.	Woodlark	Lullula arborea	VU
27.	Redstart	Phoenicurus phoenicurus	VU
28.	Black-eared Wheatear	Oenanthe hispanica	VU
29.	Lesser Grey Shrike	Lanius minor	VU
30.	Woodchat Shrike	Lanius senator	VU
31.	Masked Shrike	Lanius nubicus	VU
32.	Ortolan Bunting	Emberiza hortulana	VU
33.	Black-headed Bunting	Emberiza melanocephala	VU
	Reptiles		
34.	Aesculapian Snake	Elaphe longissima	VU

No	Common name	Scientific name	IUCN
	Amphibians		
35.	Syrian Spadefoot Toad	Pelobates syriacus	EN
	Fishes		
36.	Blennie Fluviatile	Blennius fluviatilis	
37.	Crucian Carp	Carassius carassius	
38.	Common Carp	Cyprinus carpio	
39.	Trout	Salmo trutta	

List 4. Review of Endemic and Relic Species of the Flora

Endemic Flora Species	
Viola arsenica	Campanula debarensis
Astragalus cernjavski	Verbascum herzegi
Viola allchariensis	Tulipa marianae
Verbascum scardicum	Moehringia minutiflora
Potentilla doerfleri	Asplenium macedonicum
Centaurea galicicae	Verbascum adenantum
Centaurea tomorosii	Centaurea marmorea
Crocus pelistericus	Centaurea kozjakensis
Dianthus kapinensis	Silene viscariopsis
Hedysarum macedonicum	Satureja fukarekiana
Salvia jurisicii	Pulsatilla halleri ssp. macedonica
Ferulago macedonica	Satureja adamovicii
Sambucus deborensis	Sempervivum macedonicum
Colchicum macedonicum	Pedicularis limnogenia
Pedicularis ferdinandii	Verbascum pachyurum
Centaurea grbavacensis	Alkanna nonneiformis
Astragalus gracianini	Tulipa scardica
Iliric, scardopindean and mezian endemic species	
Sesleria corabensis	Crocus scardicus
Narthecium scardicum	Lilium albanicum
Dianthus scardicus	Pinus peuce
Sesleria corabensis	Crocus scardicus
Narthecium scardicum	Lilium albanicum
Dianthus scardicus	Pinus peuce
Silene lerchenfeldiana	Rhamnus rupestris
Draba korabensis	Digitalis viridiflora
Onobrychis scardica	Centhrantus junceum
Sempervivum macedonicum	Pancicia serbica
Sideritis scardica	Abies borisii regis
Carex rigida var. macedonica	Draba scardica
Solenanthes scardicus	Anthyllis aurea

Relic flora species	
Thymus oehmianus	Ostrya carpinifolia
Campanula formanekiana	Ruscus hypoglossum
Viola kosaninii	Narthecium scardicum
Crocus cvijici	Swerthia punctata
Ramonda serbica	Taxus baccata
Acer heldreichii	Trolius europaeus
Pinus heldreichii	Rhamus rupestris
Pinus peuce	Gentiana asclepiadea
Boreal and arctic endemic species	
Trifolium pilczii	Vaccinium uliginosum
Carex laevis	Dryas octopetala
Carex curvula	Arabis alpina
Arctostaphylos uva ursi	Carex rigida var. macedonica
Salix retusa	Salix reticulata
Salix herbacea	Primula minima

List of Protected Areas in Macedonia (by IUCN Category)

Category I: Strictly protected natural reserves are:

- **SPR Ezerani**, on Prespa Lake, with 2080 ha, a wetland areas the biological diversity is represented mainly by swampy and grass vegetation and water birds; and
- **SPR Tikves**, in the gorge of Crna Reka with 10650 ha. represented by hilly and mountainous dendoflora, birds of prey, water birds and animals.

Category II: National Parks are the largest area of protection covering 108,338 ha. These are all in forested mountainous areas:

- **NP Mavrovo** with 73,088 ha, was declared in 1958. Some 27,000 ha are forested. It is estimated that it includes more than 1,000 types of higher plant forms, about 100 (or 10%) of which are extremely rare and endemic to the Balkans. Mavrovo is also home to over 100 brown bears and other fauna.
- **NP Galichica** with 22,750 ha, is situated between Lake Ohrid and Lake Prespa and was declared a park in 1958. The vegetation in this park is particularly rich with nineteen different forest communities discovered here and several extremely rare types of flora.
- **NP Pelister** with 12,500 ha. – the oldest national park was established in 1948. The park gets its name from the five needle Molica (pelister or macedonian) pine, the only such variety in the world, and covers approximately 1,600 ha – the largest concentration of this Balkan endemic (which also has a small population in Bulgaria). Pelister is also home to over 27 brown bears and other fauna.

The representatives of the mountain dendoflora hold the dominant position within national parks.

Category III: Natural Monuments Monuments of nature (MN) occupy 58,084 ha. Biological diversity within monuments of nature is mainly represented by aquatic flora and fauna species (in water ecosystems), grass, swampy, hilly and mountain flora, fungi and fauna. These include the following:

The three glacial lakes (see discussion on lakes which follows):

- **MN Ohrid Lake** with 23000 ha,
- **MN Prespa Lake** with 17680 ha,
- **MN Doyran Lake** with 2730 ha,

Numerous other natural features, include:

- **MN Gorge of Matka** with 5443 ha,
- **MN Katlanovski predel** with 5442 ha,
- **MN Markovi kuli** (The Tower of King Marko) with 2300 ha,

- MN Monospitovsko Blato (Swamp) with 250 ha,
- MN Demir Kapija with 200 ha,
- MN Arboretum Gazi Baba with 3,3 ha,
- MN Iceland of Gazi Baba with 13 ha,
- MN Gol Covek (Naked Man) with 5 ha
- MN Drenacka Klisura (Gorge) with 5 ha,
- MN Karsi Bavci with 10 ha,
- MN Murite with 10 ha,
- MN Konce with 0,7 ha, and
- MN Morodvis with 0,5 ha.

Examples of IUCN Category III — Natural Monuments

Demir Kapija - This is the longest gorge of the river Vardar (19 km). It is passing through limestone and eruptive rocks that are dividing Tikvesh valley on the northwest and Gevgelija-Valandovo valley on the southeast. The entrance in the gorge is especially impressive canyon, 0,9 km in length, with different carstic shapes on its slopes – caves. The Demir Kapija gorge is among the richest ornithological reserves in Europe. The rare birds of prey include: griffin vulture (*Gyps fulvus*), Egyptian vulture (*Neophron percnopterus*), golden eagle (*Aquila chrysaetos*), shot-toed eagle (*Circaetus gallicus*), long-legged buzzard (*Buteo rufinus*), and different falcons (*Falco peregrinus*, *Falco naumanni*). Other rare and scientifically important bird species are also present in this area. In the Demir Kapija gorge, important mammal, reptile, and insect species are present as well as rare and endemic plant species (*Caladonia macedonica*, *Lilium: heldreichii*, *Lilium martagon*, *Kitaibelia vitifolia* etc.).

Markovi Kuli – Massive rocks called Markovi Kuli are located in the central part of Macedonia, north of the town of Prilep. They are composed of numerous small denudation shapes dated from the Precambrian age. Their composition is of granite, with shapes representing relief sculptures (peaks, earth pillars, columns, plaques, splieres etc.). The height of separate massifs is over 1000 m. From the floristic point of view, the presence of endemic plants is important: *Asplenium macedonicum* Kummerle, *Verbascum adenanthum* Bornm, *Centaurea karamani* O. & E. Beher et Wad, *Moehringia minutiflora* Bornm. And *Silene viscariopsis* Bornm. Among the relict plant species, the presence of *Isoetes phrygia* Boiss. Is worth noting.

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Category IV: Occupying 2,338 ha (0.09%) are three natural reserves of of special natural features:

- Leskoec (300 ha),
- Vodno (1,953 ha), and
- Kozle (85 ha).

Category V: Individual plant and animal species outside of natural reserves occupy 2,647 ha. or 0.10%. There are 14 sites of natural habitats of wild flora species, fungi and fauna species. They contain mainly protected species of dendoflora (most of all pine tree, fir tree, yew, juniper, oak tree, beech, birch, wild chestnut, platan, etc.).